

Pre-activation conditions	Site	
	Fatigue	Fatigue
	Pyrexia	Pyrexia
	Peripheral edema	Non-cardiac chest pain
		Peripheral edema
		Edema
	<u>Common</u>	
	Non-cardiac chest pain	
	Edema	

Investigations	Common Alanine aminotransferase increased Weight decreased	Frecuentes Weight decreased
		Uncommon Alanine aminotransferase increased
Injury, poisoning and procedural complication	Common Fall	Unknown Fall

Table of adverse reactions

- Pomalidomide in combination with dexamethasone

In a randomized study (CC-4047-MM-003), 302 patients with relapsed and refractory multiple myeloma were administered 4 mg pomalidomide once daily on days 1 to 21 of each 28-day cycle in combination with a low weekly dose of dexamethasone.

Adverse reactions observed in patients treated with pomalidomide in combination with dexamethasone are listed in Table 8, according to the system organ class (SOC) and frequency for all adverse reactions (ADRs), and for Grade 3 or 4 adverse reactions. Frequencies of adverse reactions are those reported in the pomalidomide plus dexamethasone arm of study CC-4047-MM-003 (n=302). Adverse reactions are presented in order of decreasing seriousness within each SOC interval and frequency.

Frequencies are defined in accordance with current guidance, as: very common (≥1/10), common (≥1/100 to <1/10) and uncommon (≥1/1,000 to <1/100) and not known (frequency cannot be determined).

Table 8. Adverse reactions (ADRs) reported in clinical trial MM-003 in patients treated with pomalidomide in combination with dexamethasone.

System Organ Class /Preferred term	All ADRs/Frequency	Grade 3–4 ADRs / Frequency
Infections and infestations	Very common Pneumonia (bacterial, viral, and fungal infections, including opportunistic infections)	Common Neutropenic sepsis, Pneumonia (bacterial, viral and fungal infections, including opportunistic infections)
	Common neutropenic sepsis Bronchopneumonia Bronchitis Respiratory tract infection Upper respiratory tract infection Upper respiratory tract infection Nasopharyngitis Herpes zoster	Uncommon Respiratory tract infection Upper respiratory tract infection Uncommon Bronchitis Herpes zoster
Neoplasms benign, malignant and unspecified (incl cysts and polyps)	Uncommon Basal cell carcinoma Basal cell carcinoma of the skin	Uncommon Basal cell carcinoma Basal cell carcinoma of the skin
Blood and lymphatic system disorders	Very common Neutropenia Thrombocytopenia Leukopenia Anemia	Very common Neutropenia Thrombocytopenia Anemia
	Common Febrile neutropenia	Common Febrile neutropenia Leukopenia
Metabolism and nutrition disorders	Very common Decreased appetite	Common Hyperkalemia Hyponatremia
	Common Hyperkalemia Hyponatremia	Uncommon Decreased appetite
Psychiatric disorders	Common Confusional state	Common Confusional state
Nervous system disorders	Common Decreased level of consciousness Peripheral sensory neuropathy Dizziness Tremor	Common Decreased level of consciousness
		Uncommon Peripheral sensory neuropathy D
Ear and labyrinth disorders	Common Vertigo	Common Vertigo
	Common Deep vein thrombosis	Uncommon Deep vein thrombosis
Respiratory, thoracic and mediastinal disorders	Very Common Dyspnea Cough	Frecuentes Dyspnea
	Common Pulmonary embolism	Uncommon Pulmonary embolism Cough
Gastrointestinal disorders	Very Common Diarrhea Nausea Constipation	Common Diarrhea Vomiting Constipation
	Common Vomiting Gastrointestinal hemorrhage	Uncommon Nausea Gastrointestinal hemorrhage
Hepatobiliary disorders	Uncommon Hyperbilirubinemia	Uncommon Hyperbilirubinemia
Skin and subcutaneous tissue disorders	Common Rash Pruritus	Common Rash
Musculoskeletal and connective tissue disorders	Very Common Bone pain Muscle spasms	Common Bone pain
		Uncommon Muscle spasms
Renal and urinary disorders	Common Renal failure Urinary retention	Common Renal failure
		Uncommon Urinary retention
Reproductive system and breast disorders	Common Pelvic pain	Common Pelvic pain
General disorders and administration site conditions	Very Common Fatigue Pyrexia Edema peripheral	Common Fatigue Pyrexia Edema peripheral
	Common Neutrophil count decreased Leukocyte count decreased Platelet count decreased Alanine aminotransferase increased	Common Neutrophil count decreased Leukocyte count decreased Platelet count decreased Alanine aminotransferase increased
Investigations	Common Neutrophil count decreased Leukocyte count decreased Platelet count decreased Alanine aminotransferase increased	Common Neutrophil count decreased Leukocyte count decreased Platelet count decreased Alanine aminotransferase increased

Reported during post-marketing use.

In addition to the above adverse reactions identified from the pivotal clinical studies, Table 9 below is derived from data collected from post-marketing surveillance.

Table 9. Adverse reactions (ADRs) reported in patients treated with pomalidomide during post-marketing use.

System Organ Class /Preferred term	All ADRs/Frequency	Grade 3-4 ADRs / Frequency
Infections and infestations	Not known Hepatitis B reactivation	Not known Hepatitis B reactivation
Blood and lymphatic system disorders	Common Pancytopenia	Common Pancytopenia
	Common Hyperuricemia	Common Hyperuricemia
Metabolism and nutrition disorders	Uncommon Tumor lysis syndrome	Uncommon Tumor lysis syndrome
	Common Intracranial hemorrhage	Uncommon Cerebrovascular accident Intracranial hemorrhage
Nervous system disorders	Uncommon Cerebrovascular accident	
Cardiac disorders	Common Heart failure Atrial fibrillation Myocardial infarction	Common Heart failure Atrial fibrillation
		Uncommon Myocardial infarction
Immune system disorders	Common Angioedema Urticaria	Uncommon Angioedema Urticaria
	Common Epistaxis Interstitial lung disease	Uncommon Epistaxis
Hepatobiliary disorders	Uncommon Hepatitis	
Skin and subcutaneous tissue disorders	Not known Drug reaction with eosinophilia and systemic symptoms Toxic epidermal necrolysis Stevens-Johnson syndrome	Not known Drug reaction with eosinophilia and systemic symptoms Toxic epidermal necrolysis Stevens-Johnson syndrome
	Common Blood uric acid increased	Uncommon Blood uric acid increased

Description of selected adverse reactions

Teratogenicity

Pomalidomide is structurally related to thalidomide. Thalidomide is an active substance known to be teratogenic in humans, causing severe life-threatening birth defects. Pomalidomide was found to be teratogenic in rats and rabbits when administered during the period of major organogenesis (see sections 4.6 and 5.3). If pomalidomide is taken during pregnancy, a teratogenic effect of pomalidomide in humans is expected (see section 4.4).

Neutropenia and thrombocytopenia
Neutropenia occurred in up to 46.8% of patients who received therapy in combination with pomalidomide (41.7% Grade 3 or 4). Neutropenia did not lead to pomalidomide discontinuation in any patient and was infrequently serious. Febrile neutropenia (FN) was reported in 3.2-6.7 % of patients and was serious in 1.8-4.0 % of patients (see sections 4.2 and 4.4).

Thrombocytopenia occurred in 27.0% and 36.7 % of patients who received pomalidomide combined therapy. Thrombocytopenia was Grade 3 or 4 in 20.7% and 27.3% of patients, led to pomalidomide discontinuation in 0.7% of patients and was serious in 0.4% and 1.7% of patients (see sections 4.2 and 4.4).

Neutropenia and thrombocytopenia tended to occur more frequently within the first 2 cycles of treatment with pomalidomide.

Infection

Infection was the most common non hematological toxicity.

Infection occurred in 55.0% and 80.2% of patients who received pomalidomide combination therapy (24.0% to 30.9% were Grade 3 or 4). The most frequently reported infections were pneumonia and upper respiratory tract infection. Fatal infections occurred in 2.7% and 4.0% of patients (Grade 5). Infections led to discontinuation of pomalidomide in 2.0-2.9% of patients.

Thromboembolic events

Prophylaxis with acetylsalicylic acid (and other anticoagulants in high-risk patients) was mandatory for all patients in clinical studies. Anticoagulation therapy (unless contraindicated) is recommended (see section 4.4).

Venous thromboembolism (VTE) occurred in 3.3% and 11.5% of patients receiving combination therapy with pomalidomide (1.3% to 5.4% Grade 3 or 4). VTE was reported as serious in 1.7-4.3% of patients, no fatal reactions were reported, and VTE was associated with pomalidomide discontinuation in up to 1.8% of patients.

Peripheral neuropathy

- Pomalidomide in combination with bortezomib and dexamethasone

Patients with ongoing peripheral neuropathy ≥ Grade 2 with pain within 14 days prior to randomization were excluded from clinical trials. Peripheral neuropathy occurred in 55.4 % of patients (10.8% Grade 3; 3.07% Grade 4). Exposure-adjusted rates were comparable across treatment arms. Approximately 30% of the patients experiencing peripheral neuropathy had a history of neuropathy at baseline. Peripheral neuropathy led to discontinuation of bortezomib in approximately 12.9% of patients, pomalidomide in 1.8% and dexamethasone in 2.2%-8.9 % of patients, respectively. See also bortezomib SmPC.

- Pomalidomide in combination with dexamethasone

Patients with ongoing peripheral neuropathy ≥ Grade 2 were excluded from clinical studies. Peripheral neuropathy occurred in 12.3% of patients (1.0% Grade 3 or 4). No peripheral neuropathy reactions were reported as serious, and peripheral neuropathy led to dose discontinuation in 0.3% of patients (see section 4.4).

Hemorrhage

Hemorrhagic disorders have been reported with pomalidomide, especially in patients with risk factors such as concomitant medicinal products that increase susceptibility to bleeding. Hemorrhagic events have included epistaxis, intracranial hemorrhage, and gastrointestinal hemorrhage.

Allergic reactions and severe skin reactions

Angioedema, anaphylactic reaction, and severe cutaneous reactions including SJS, TEN and DRESS have been reported with the use of pomalidomide. Patients with a history of severe rash associated with lenalidomide or thalidomide should not receive pomalidomide (see section 4.4).

Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorization of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the national reporting system.

Risk Management Plan

Significant Risk Identified

Teratogenicity

Serious infection due to Neutropenia and pancytopenia

Thrombocytopenia and bleeding

Heart failure

Non-melanoma skin cancer

Important Potential Risk

Second malignancies

Cardiac arrhythmia

Off-label use

Missing information

None

4.9 Overdose

Pomalidomide doses as high as 50 mg as a single dose in healthy volunteers have been studied without reporting serious adverse reactions related to overdose. Doses as high as 10 mg once-daily provided in multiple myeloma patients have been studied without reported serious adverse reactions related to overdose. The dose-limiting toxicity was myelosuppression. In studies, pomalidomide was found to be removed by hemodialysis. In the event of overdose, supportive care is advised.

5. PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic group: Immunosuppressants, Other immunosuppressants, ATC code: L04AX06.

Mechanism of action

Pomalidomide has direct anti-myeloma tumoricidal activity, immunomodulatory activities and inhibits stromal cell support for multiple myeloma tumor cell growth. Specifically, pomalidomide inhibits proliferation and induces apoptosis of hematopoietic tumor cells. Additionally, pomalidomide inhibits the proliferation of lenalidomide-resistant multiple myeloma cell lines and synergizes with dexamethasone in both lenalidomide-sensitive and lenalidomide-resistant cell lines to induce tumor cell apoptosis. Pomalidomide enhances T cell- and *natural killer* (NK) cell-mediated immunity and inhibits production of pro-inflammatory cytokines (eg, TNF-α and IL-6) by monocytes. Pomalidomide also inhibits angiogenesis by blocking the migration and adhesion of endothelial cells.

Pomalidomide binds directly to the protein cereblon (CRBN), which is part of an E3 ligase complex that includes deoxyribonucleic acid (DNA) damage-binding protein 1 (DDB1), cullin 4 (CUL4), and regulator of cullins-1 (Roc1), and can inhibit the auto-ubiquitination of CRBN within the complex. E3 ubiquitin ligases are responsible for the poly-ubiquitination of a variety of substrate proteins and may partially explain the pleiotropic cellular effects observed with pomalidomide treatment.

In the presence of pomalidomide in vitro, substrate proteins Aiclos and Ikaros are targeted for ubiquitination and subsequent degradation leading to direct cytotoxic and immunomodulatory effects. In vivo, pomalidomide therapy led to reduction in the levels of Ikaros in patients with relapsed lenalidomide-refractory multiple myeloma.

Clinical efficacy and safety

- Pomalidomide in combination with bortezomib and dexamethasone

The efficacy and safety of pomalidomide in combination with bortezomib and low-dose dexamethasone (Pom+BTz+LD-Dex) was compared with bortezomib and low-dose dexamethasone (BTz+LD-Dex) in a Phase III multi-center, randomized, open-label study (CC-4047-MM-007), in previously treated adult patients with multiple myeloma, who had received at least one prior regimen, including lenalidomide and have demonstrated disease progression on or after the last therapy. A total of 559 patients were enrolled and randomized in the study: 281 in the Pom+BTz+LD-Dex arm and 278 in the BTz+LD-Dex arm. 54% of patients were male with median age for the overall population of 68 years (min, max: 27, 89 years). Approximately 70% of patients were refractory to lenalidomide (71.2% in Pom+BTz+LD-Dex, 68.7 % in BTz+LD-Dex). Approximately 40% of patients were in 1st relapse and approximately 73% of patients received bortezomib as prior treatment.

Patients in the Pom+BTz+LD-Dex arm were administered 4 mg pomalidomide orally on Days 1 to 14 of each 21-day cycle. Bortezomib (1.3 mg/m2/dose) was administered to patients in both study arms on Days 1, 4, 8 and 11 of a 21-day cycle for Cycles 1 to 8; and on Days 1 and 8 of a 21-day cycle for Cycles 9 and onwards. Low-dose dexamethasone (20 mg/day [≤ 75 years old] or 10 mg/day [≥ 75 years old]) was administered to patients in both study arms on Days 1, 2, 4, 5, 8, 9, 11 and 12 of a 21-day cycle for Cycles 1 to 8; and on Days 1, 2, 8 and 9 of each subsequent 21-day cycle from Cycles 9 onwards. Doses were reduced and treatment was temporarily interrupted or stopped as needed to manage toxicity (see section 4.2).

The primary efficacy endpoint was Progression Free Survival (PFS) assessed by an Independent Response Adjudication Committee (IRAC) according to the IMWG criteria using the intent to treat population (ITT). After a median follow-up of 15.9 months, median PFS time was 11.20 months (95% CI: 9.66, 13.73) in the Pom+BTz+LD-Dex arm. In the BTz+LD-Dex arm, median PFS time was 7.1 months (95% CI: 5.88, 8.48)

Summary of overall efficacy data are presented in Table 10 using a cut-off date of 26 Oct 2017. Kaplan-Meier curve for PFS for the ITT population is provided in Figure 1.

Table 10. Summary of overall efficacy data

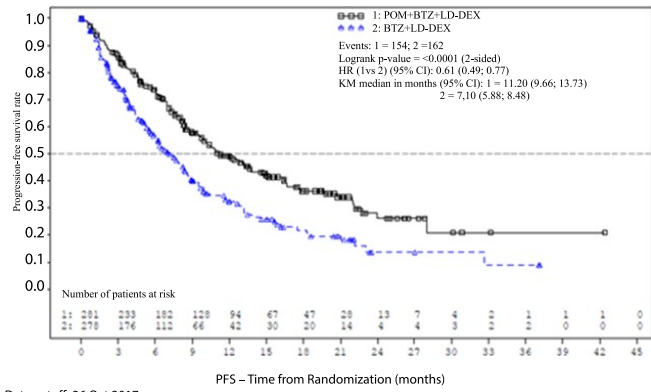
	Pom+BTz+LD-Dex (N = 281)	BTz+LD-Dex (N = 278)
PFS (months)		
Median* time (95% CI) ^a	11.20 (9.66, 13.73)	7.10 (5.88, 8.48)
HR: (95% CI), p-value ^d	0.61 (0.49, 0.77); <0.0001	
ORR, n (%)	82.2 %	50.0%
CR ^b	9 (3.2)	2 (0.7)
CR ^c	35 (12.5)	9 (3.2)
VGPR	104 (37.0)	40 (14.4)
PR	83 (29.5)	88 (31.7)
OR (95% CI) ^d ; p-value ^d	5.02 (3.35, 7.52); <0.0001	
DoR (months)		
Median* time (95% CI) ^a	13.7 (10.94, 18.10)	10.94 (8.11, 14.78)

BTz = bortezomib; CI = Confidence interval; CR = Complete response; DoR = Duration of response; HR = Hazard Ratio; LD-Dex = low-dose dexamethasone; OR = Odds ratio; ORR = Overall response rate; PFS = Progression free survival; POM = pomalidomide; PR = Partial Response; SCR = Stringent complete response; VGPR = Very good partial response
^a The median is based on the Kaplan-Meier estimate.
^b 95% CI about the median.
^c Based on Cox proportional hazards model.
^d The p-value is based on a stratified log-rank test.
^e Odds ratio is for Pom+BTz+LD-Dex vs BTz+LD-Dex.
^f The p-value is based on a CMH test, stratified by age (<=75 vs >75). Prior number of antimyeloma regimens (1 vs >1), and Beta-2 microglobulin at screening (≤ 3.5 mg/L versus > 3.5 mg/L vs > 5.5 mg/L versus > 5.5 mg/L)

The median duration of treatment was 8.8 months (12 treatment cycles) in the Pom+BTz+LD-Dex arm and 4.9 months (7 treatment cycles) in the BTz+LD-Dex arm.

The PFS advantage was more pronounced in patients who received only one prior line of therapy. In patients who received 1 prior antimyeloma line, median PFS time was 20.73 months (95% CI: 15.11, 27.99) in the Pom + BTz + LD-Dex arm and 11.63 months (95% CI: 7.52, 15.74) in the BTz + LD-Dex arm. A 46% risk reduction was observed with Pom + BTz + LD-Dex treatment (HR = 0.54, 95% CI: 0.36, 0.82).

Figure 1. Progression Free Survival Based on IRAC Review of Response by IMWG Criteria (Stratified Log Rank Test) (ITT Population).



Data cutoff: 26 Oct 2017

As per an interim analysis for Overall Survival (OS), using a cut-off of 15 September 2018 (median

follow-up period of 26.2 months), median OS time from Kaplan-Meier estimates was 40.5 months for the Pom + Btz + LD-Dex arm and 30.5 months for the Btz + LD-Dex arm; HR = 0.91, 95% CI: 0.70, 1.18, with an overall event rate of 43.3%.

- Pomalidomide in combination with dexamethasone

The efficacy and safety of pomalidomide in combination with dexamethasone were evaluated in a Phase III multi-center, randomized, open-label study (CC-4047-MM-003), where pomalidomide plus low-dose dexamethasone therapy (Pom+LD-Dex) was compared to high-dose dexamethasone alone (HD-Dex) in previously treated adult patients with relapsed and refractory multiple myeloma, who have received at least two prior treatment regimens, including both lenalidomide and bortezomib, and have demonstrated disease progression on the last therapy. A total of 455 patients were enrolled in the study: 302 in the Pom+LD-Dex arm and 153 in the HD-Dex arm. The majority of patients were male 24 (59%) and white (79%); the median age for the overall population was 64 years (min, max: 35, 87 years).

Patients in the Pom+LD-Dex arm were administered 4 mg pomalidomide orally on days 1 to 21 of each 28-day cycle. LD-Dex (40 mg) was administered once per day on days 1, 8, 15 and 22 of a 28-day cycle. For the HD-Dex arm, dexamethasone (40 mg) was administered once per day on days 1 through 4, 9 through 12, and 17 through 20 of a 28-day cycle. Patients > 75 years of age started treatment with 20 mg dexamethasone. Treatment continued until patients had disease progression.

The primary efficacy endpoint was progression free survival by International Myeloma Working Group (IMWG criteria). For the intention to treat (ITT) population, median PFS time by Independent Review Adjudication Committee (IRAC) review based on IMWG criteria was 15.7 weeks (95% CI:13.0, 20.1) in the Pom + LD-Dex arm; the estimated 26-week event-free survival rate was 35.99% (±3.46%). In the HD-Dex arm, median PFS time was 8.0 weeks (95% CI: 7.0, 9.0); the estimated 26-week event-free survival rate was 12.15% (±3.63%).

PFS was evaluated in several relevant subgroups: gender, race, ECOG performance status, stratification factors (age, disease population, prior anti-myeloma therapies [2, > 2]), selected parameters of prognostic significance (baseline beta-2 microglobulin level, baseline albumin levels, baseline renal impairment, and cytogenetic risk), and exposure and refractoriness to prior anti-myeloma therapies. Regardless of the subgroup evaluation, PFS was generally consistent with that observed in the ITT population for both treatment groups.

PFS is summarized in Table 11 for the ITT population. Kaplan-Meier curve for PFS for the ITT population is provided in Figure 2.

Table 11. Progression Free Survival Time by IRAC Review Based on IMWG Criteria (Stratified Log Rank Test) (ITT Population)

	Pom+LD-Dex (N=302)	HD-Dex (N=153)
Progression free survival (PFS), n	302 (100.0)	153 (100.0)
Censored, n (%)	138 (45.7)	50 (32.7)
Progressed/Died, n (%)	164 (54.3)	103 (67.3)
Progression Free Survival Time (weeks)		
Median*	15.7	8.0
[Two sided 95% CI] ^b	[13.0, 20.1]	[7.0, 9.0]
Hazard Ratio (Pom+LD-Dex:HD-Dex) 2-Sided 95% CI ^c	0.45 [0.35,0.59]	
Log-Rank Test Two-sided P-Value ^d	<0.001	

Note: CI=Confidence Interval; IRAC=Independent Review Adjudication Committee; NE = Not Estimable

*The median is based on Kaplan-Meier estimate.

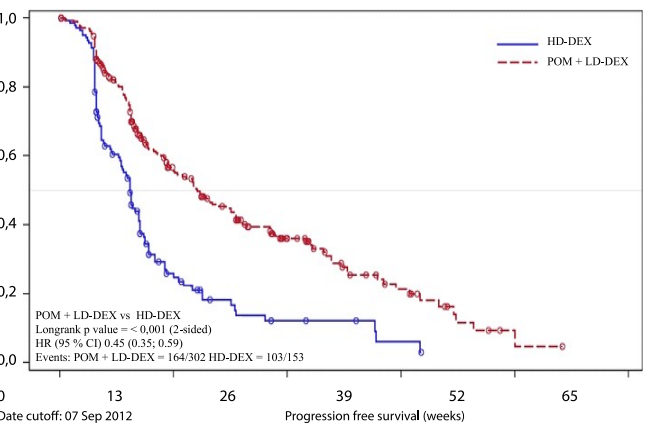
^a 95% confidence interval about the median progression free survival time.

^b Based on Cox proportional hazards model comparing the hazard functions associated with treatment groups, stratified by age (≤75 vs >75), diseases population (refractory to both lenalidomide and bortezomib vs not refractory to both active substances), and prior number of anti-myeloma therapy (=2 vs >2).

^c The p-value is based on a stratified log-rank test with the same stratification factors as the above Cox model.

Data cutoff: 07 Sep 2012

Figure 2. Progression Free Survival Based on IRAC Review of Response by IMWG Criteria (Stratified Log Rank Test) (ITT Population)



Overall Survival was the key secondary study endpoint. A total of 226 (74.8%) of the Pom + LD-Dex patients and 95 (62.1%) of the HD-Dex patients were alive as of the cutoff date (07 Sep 2012). Median OS time from Kaplan-Meier estimates has not been reached for the Pom + LD-Dex, but would be expected to be at least 48 weeks, which is the lower boundary of the 95% CI. Median OS time for the HD-Dex arm was 34 weeks (95% CI: 23.4, 39.9). The 1-year event free rate was 52.6% (± 5.73%) for the Pom + LD-Dex arm and 28.4% (± 7.51%) for the HD-Dex arm. The difference in OS between the two treatment arms was statistically significant (p < 0.001).

Overall survival is summarized in Table 12 for the ITT population. Kaplan-Meier curve for OS for the ITT population is provided in Figure 3.