HIGHLIGHTS OF PRESCRIBING INFORMATION
These highlights do not include all the information needed to use THALOMID® safely and effectively. See full prescribing information for THALOMID.

THALOMID (thalidomide) capsules, for oral use

Initial U.S. Approval: 1998

WARNING: EMBRYO-FETAL TOXICITY AND VENOUS THROMBOEMBOLISM
See full prescribing information for complete boxed warning.

EMBRYO-FETAL TOXICITY
- If THALOMID is taken during pregnancy, it can cause severe birth defects or embryo-fetal death. THALOMID should never be used by females who are pregnant or who could be pregnant while taking the drug. Even a single dose [1 capsule (regardless of strength)] taken by a pregnant woman during her pregnancy can cause severe birth defects.
- Pregnancy must be excluded before start of treatment. Prevent pregnancy thereafter by the use of two reliable methods of contraception. (5.1, 8.3)

THALOMID is only available through a restricted distribution program, the THALOMID REMS® program (5.2).

VENOUS THROMBOEMBOLISM
- Significant increased risk of deep vein thrombosis (DVT) and pulmonary embolism (PE) in patients with multiple myeloma receiving THALOMID with dexamethasone (5.3).

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INDICATIONS AND USAGE
- THALOMID in combination with dexamethasone is indicated for the treatment of patients with newly diagnosed multiple myeloma (MM). (1.1)
- THALOMID is indicated for the acute treatment of the cutaneous manifestations of moderate to severe erythema nodosum leprosum (ENL).
- THALOMID is not indicated as monotherapy for such ENL treatment in the presence of moderate to severe neuritis.
- THALOMID is also indicated as maintenance therapy for prevention and suppression of the cutaneous manifestations of ENL recurrence. (1.2)

DOSE AND ADMINISTRATION
- MM: 200 mg orally once daily. The recommended dose of dexamethasone is 40 mg/day on days 1-4, 9-12, and 17-20 every 28 days. (2.2)
- ENL: 100 to 300 mg/day for an episode of cutaneous ENL.
  Up to 400 mg/day for severe cutaneous ENL. (2.3)

DOSE FORMS AND STRENGTHS
Capsules: 50 mg, 100 mg, 150 mg and 200 mg. (3)

CONTRAINDICATIONS
- Pregnancy (Boxed Warning, 4.1, 5.1, 5.2, 8.1, 17)
- Demonstrated hypersensitivity to the drug or its components (4.2, 5.16, 6.2)

WARNINGS AND PRECAUTIONS
- Ischemic heart disease (including myocardial infarction) and stroke have been observed in patients treated with THALOMID in combination with dexamethasone. (5.3)

ADVERSE REACTIONS
- MM: The most common adverse reactions (≥ 20%) are fatigue, hypocalcemia, edema, constipation, neuropathy-sensory, dysnea, muscle weakness, leukopenia, neutropenia, rash/desquamation, confusion, anorexia, nausea, anxiety/agitation, asthenia, tremor, fever, weight loss, thrombosis/embolism, neuropathy-motor, weight gain, dizziness, and dry skin. (6.1)
- ENL: The most common adverse reactions (≥ 10%) are somnolence, rash, and headache. (6.1)

ADVERSE REACTIONS
- Use caution if other drugs which have sedative and hypnotic properties, slow cardiac conduction and/or cause peripheral neuropathy must be used. (7.1, 7.2, 7.3)
- It is not known whether concomitant use of hormonal contraceptives further increases the risk of thromboembolism with THALOMID. (5.15, 7.4)
- Patients taking concomitant therapies such as erythropoietin stimulating agents or estrogen containing therapies may have an increased risk of thromboembolism. (7.7)

DRUG INTERACTIONS
- CNS Depressants (Including Alcohol)

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(Continued)
FULL PRESCRIBING INFORMATION

WARNING: EMBRYO-FETAL TOXICITY AND VENOUS THROMBOEMBOLISM

EMBRYO-FETAL TOXICITY

If THALOMID (thalidomide) is taken during pregnancy, it can cause severe birth defects or embryo-fetal death. THALOMID should never be used by females who are pregnant or who could become pregnant while taking the drug. Even a single dose (1 capsule regardless of strength) taken by a pregnant woman during her pregnancy can cause severe birth defects.

Because of this toxicity and in an effort to make the chance of embryo-fetal exposure to THALOMID as negligible as possible, THALOMID is approved for marketing only through a special restricted distribution program: THALOMID REMS program, approved by the Food and Drug Administration. Information about THALOMID and the THALOMID REMS program is available at www.thalomidrems.com or by calling the REMS Call Center at 1-888-423-5436.

VENOUS THROMBOEMBOLISM

The use of THALOMID in multiple myeloma results in an increased risk of venous thromboembolism, such as deep venous thrombosis and pulmonary embolism. This risk increases significantly when THALOMID is used in combination with standard chemotherapeutic agents including dexamethasone. In one controlled trial, the rate of venous thromboembolism was 22.5% in patients receiving THALOMID in combination with dexamethasone compared to 4.9% in patients receiving dexamethasone alone (p=0.002). Patients and physicians are advised to be observant for the signs and symptoms of thromboembolism. Instruct patients to seek medical care if they develop symptoms such as shortness of breath, chest pain, or arm or leg swelling. Consider thromboprophylaxis based on an assessment of individual patients’ underlying risk factors.

1 INDICATIONS AND USAGE

1.1 Multiple Myeloma

THALOMID in combination with dexamethasone is indicated for the treatment of patients with newly diagnosed multiple myeloma (MM) [see Clinical Studies (14.1)].

1.2 Erythema Nodosum Leprosum

THALOMID is indicated for the acute treatment of the cutaneous manifestations of moderate to severe erythema nodosum leprosum (ENL).

THALOMID is not indicated as monotherapy for such ENL treatment in the presence of moderate to severe neuritis.

THALOMID is also indicated as maintenance therapy for prevention and suppression of the cutaneous manifestations of ENL recurrence [see Clinical Studies (14.2)].

2 DOSAGE AND ADMINISTRATION

2.1 Required Baseline Testing

Drug prescribing to females of reproductive potential is contingent upon initial and continued negative results of pregnancy testing [see Warnings and Precautions (5.1 and 5.2)].

THALOMID must only be administered in compliance with all of the terms outlined in the THALOMID REMS program. THALOMID may only be prescribed by prescribers certified with the THALOMID REMS program and may only be dispensed by pharmacists certified with the THALOMID REMS program.

2.2 Recommended Dosage for Multiple Myeloma

The recommended dose of THALOMID (thalidomide) in combination with dexamethasone is 200 mg once daily (in 28-day treatment cycles) orally with water, preferably at bedtime and at least 1 hour after the evening meal. The dose of dexamethasone is 40 mg daily administered orally on days 1-4, 9-12, and 17-20 every 28 days.

2.3 Recommended Dosage for Erythema Nodosum Leprosum

The recommended dose of THALOMID for an episode of cutaneous ENL in the presence of moderate to severe neuritis is 200 mg daily orally with water, preferably at bedtime and at least 1 hour after the evening meal. Initiate dosing for patients weighing less than 50 kilograms at the low end of the dose range.

Consider dosing in the higher dosage range for patients with severe cutaneous ENL reaction, or in those who have previously required higher doses to control the reaction (possibly up to 400 mg/day) once daily at bedtime or in divided doses with water, at least 1 hour after meals.

Consider concomitant use of corticosteroids in patients with moderate to severe neuritis associated with a severe ENL reaction. Steroid usage can be tapered and discontinued when the neuritis has ameliorated.

Continue dosing with THALOMID until signs and symptoms of active reaction have subsided, usually a period of at least 2 weeks. Patients may then be tapered off medication in 50 mg decrements every 2 to 4 weeks.

Patients who have a documented history of requiring prolonged maintenance treatment to prevent the recurrence of cutaneous ENL or who flare during tapering should be maintained on the minimum dose necessary to control the reaction. Tapering off medication should be attempted every 3 to 6 months, in decrements of 50 mg every 2 to 4 weeks.

2.4 Dosage Modifications for Adverse Reactions

Interrupt THALOMID for constipation, somnolence, or peripheral neuropathy. Consider a reduced dose upon resumption of treatment.

Consider dose reduction, delay, or discontinuation in patients who develop National Cancer Institute Common Toxicity Criteria (NCI CTC) Grade 3 or 4 adverse reactions and/or based on clinical judgment.

Permanently discontinue THALOMID for angioedema, anaphylaxis, Grade 4 rash, skin exfoliation, bullae, or any other severe dermatologic reactions [see Warnings and Precautions (5.12 and 5.16)].

3 DOSAGE FORMS AND STRENGTHS

Capsules:

- 50 mg white, printed with “BMS/50 mg” on the body and a “Do Not Get Pregnant” logo on the cap.
- 100 mg tan, printed with “BMS/100 mg” on the body and a “Do Not Get Pregnant” logo on the cap.
- 150 mg tan body printed with “BMS/150 mg” and blue cap printed with a “Do Not Get Pregnant” logo.
- 200 mg blue, printed with “BMS/200 mg” on the body and a “Do Not Get Pregnant” logo on the cap.

4 CONTRAINDICATIONS

4.1 Pregnancy

THALOMID is contraindicated in females who are pregnant. THALOMID can cause fetal harm when administered to a pregnant female [see Boxed Warning, Warnings and
THALOMID® (thalidomide)

Precautions (5.1) and Use in Specific Populations (8.1). THALOMID is a powerful human teratogen, inducing a high frequency of severe and life-threatening birth defects, even after a single dose [see Boxed Warning]. Mortality at or shortly after birth has been reported in about 40% of infants. If this drug is used during pregnancy, or if the patient becomes pregnant while taking this drug, the patient should be apprised of the potential risk to a fetus. If pregnancy occurs during THALOMID treatment, the drug should be discontinued immediately.

4.2 Hypersensitivity

THALOMID is contraindicated in patients who have demonstrated hypersensitivity to the drug or its components [see Warnings and Precautions (5.10)].

5 WARNINGS AND PRECAUTIONS

5.1 Embryo-Fetal Toxicity

THALOMID is a powerful human teratogen that induces a high frequency of severe and life-threatening birth defects, even after a single dose. Mortality at or shortly after birth has been reported in about 40% of infants. When there is no satisfactory alternative treatment, females of reproductive potential may be treated with THALOMID provided adequate precautions are taken to avoid pregnancy. THALOMID is only available through the THALOMID REMS program [see Warnings and Precautions (5.2)].

Oral ingestion is the only type of maternal THALOMID exposure known to result in drug-associated birth defects. There are no specific data available regarding the reproductive risks of cutaneous absorption or inhalation of THALOMID; however, females of reproductive potential should avoid contact with THALOMID Capsules. THALOMID Capsules should be stored in blister packs until ingestion. If there is contact with non-intact THALOMID capsules or the powder contents, the exposed area should be washed with soap and water.

If healthcare providers or other care givers are exposed to body fluids from patients receiving THALOMID, the exposed area should be washed with soap and water. Appropriate precautions should be utilized, such as wearing gloves to prevent the potential cutaneous exposure to THALOMID.

Females of Reproductive Potential

Females of reproductive potential must avoid pregnancy for at least 4 weeks before beginning THALOMID therapy, during therapy, during dose interruptions and for at least 4 weeks after completing therapy.

Females must commit either to abstain continuously from heterosexual sexual intercourse or to use two methods of reliable birth control, beginning 4 weeks prior to initiating treatment with THALOMID, during therapy, during dose interruptions and continuing for 4 weeks following discontinuation of THALOMID therapy.

Two negative pregnancy tests must be obtained prior to initiating therapy. The first test should be performed within 10-14 days and the second test within 24 hours prior to prescribing THALOMID therapy and then weekly during the first month, then monthly thereafter in females with regular menstrual cycles or every 2 weeks in females with irregular menstrual cycles [see Use in Specific Populations (8.3)].

Males

Thalidomide is present in the semen of patients receiving THALOMID. Therefore, males must always use a latex or synthetic condom during any sexual contact with females of reproductive potential while taking THALOMID and for up to 4 weeks after discontinuing THALOMID, even if they have undergone a successful vasectomy. Male patients taking THALOMID must not donate sperm [see Use in Specific Populations (8.3)].

Blood Donation

Patients must not donate blood during treatment with THALOMID and for 4 weeks following discontinuation of the drug because the blood might be given to a pregnant female patient whose fetus must not be exposed to THALOMID.

5.2 THALOMID REMS Program

Because of the embryo-fetal risk [see Warnings and Precautions (5.1)], THALOMID is available only through a restricted program under a Risk Evaluation and Mitigation Strategy (REMS), the THALOMID REMS program.

Required components of the THALOMID REMS program include the following:

- Prescribers must be certified with the THALOMID REMS program by enrolling and complying with the REMS requirements.
- Patients must sign a Patient-Physician Agreement Form and comply with the REMS requirements. In particular, female patients of reproductive potential who are not pregnant must comply with the pregnancy testing and contraception requirements [see Use in Specific Populations (8.3)] and males must comply with contraception requirements [see Use in Specific Populations (8.3)].
- Pharmacies must be certified with the THALOMID REMS program, must only dispense to patients who are authorized to receive THALOMID and comply with REMS requirements.

Further information about the THALOMID REMS program is available at www.thalomidrems.com or by telephone at 1-888-423-5436.

5.3 Venous and Arterial Thromboembolism

The use of THALOMID in patients with MM results in an increased risk of venous thromboembolism, such as deep vein thrombosis and pulmonary embolism. This risk increases significantly when THALOMID is used in combination with standard chemotherapeutic agents including dexamethasone. In one controlled trial, the rate of venous thromboembolism was 22.5% in patients receiving THALOMID in combination with dexamethasone compared to 4.5% in patients receiving dexamethasone alone (p=0.002). Ischemic heart disease (11.1%), including myocardial infarction (1.3%), and stroke (cerebrovascular accident, 2.6%) have also occurred in patients with previously untreated MM treated with THALOMID and dexamethasone compared to placebo and dexamethasone (4.7%, 1.7%, and 0.9%, respectively) in one clinical trial [see Adverse Reactions (6.1)].

Consider thromboprophylaxis based on an assessment of individual patients’ underlying risk factors. Patients and physicians should be observant for the signs and symptoms of thromboembolism. Advise patients to seek immediate medical care if they develop symptoms such as shortness of breath, chest pain, or arm or leg swelling [see Boxed Warning]. Agents that also may increase the risk of thromboembolism should be used with caution in patients receiving THALOMID [see Drug Interactions (7.7)].

5.4 Increased Mortality in Patients with MM When Pembrolizumab is Added to a Thalidomide Analogue and Dexamethasone

In two randomized clinical trials in patients with MM, the addition of pembrolizumab to a thalidomide analogue plus dexamethasone, a use for which no PD-1 or PD-L1 blocking antibody is indicated, resulted in decreased mortality. Treatment of patients with MM with a PD-1 or PD-L1 blocking antibody in combination with a thalidomide analogue plus dexamethasone is not recommended outside of controlled clinical trials.

5.5 Drowsiness and Somnolence

THALOMID frequently causes drowsiness and somnolence. Patients should be advised to avoid situations where drowsiness may be a problem and not to take other medications that may cause drowsiness without adequate medical advice [see Drug Interactions (7.1)].

Advise patients as to the possible impairment of mental and/or physical abilities required for the performance of hazardous tasks, such as driving a car or operating other complex or dangerous machinery. Dose reductions may be required.

5.6 Peripheral Neuropathy

THALOMID is known to cause nerve damage that may be permanent. Peripheral neuropathy is a common (>10%) and potentially severe adverse reaction of treatment with THALOMID that may be irreversible. Peripheral neuropathy generally occurs following chronic use over a period of months; however, peripheral neuropathy following relatively short-term use has been reported. The correlation with cumulative dose is unclear. Symptoms may occur some time after THALOMID treatment has been stopped and may resolve slowly or not at all.

Few reports of neuropathy have arisen in the treatment of ENL despite long-term THALOMID treatment. However, the inability clinically to differentiate THALOMID neuropathy from the neuropathy often seen in ENL makes it difficult to determine accurately the incidence of THALOMID-related neuropathy in patients with ENL treated with THALOMID.

Patients should be examined at monthly intervals for the first 3 months of THALOMID therapy to enable the clinician to detect early signs of neuropathy, which include numbness, tingling or pain in the hands and feet. Patients should be evaluated periodically thereafter during treatment. Patients should be regularly counseled, questioned, and evaluated for signs or symptoms of peripheral neuropathy. Consideration should be given to electrophysiological testing, consisting of measurement of sensory nerve action potential (SNAP) amplitudes at baseline and thereafter every 6 months in an effort to detect asymptomatic neuropathy. If symptoms of drug-induced neuropathy develop, THALOMID should be discontinued immediately to limit further damage, if clinically appropriate. Usually, treatment with THALOMID should only be reinitiated if the neuropathy returns to baseline status.

Medications known to be associated with neuropathy should be used with caution in patients receiving THALOMID [see Drug Interactions (7.3)].

5.7 Dizziness and Orthostatic Hypotension

Patients should also be advised that THALOMID may cause dizziness and orthostatic hypotension and that, therefore, they should sit upright for a few minutes prior to standing up from a recumbent position.

5.8 Neutropenia

Decreased white blood cell counts, including neutropenia, have been reported in association with the clinical use of THALOMID. Treatment should not be initiated with an absolute neutrophil count (ANC) of <750/mm^3. White blood cell count and differential should be monitored on an ongoing basis, especially in patients who may be more prone to neutropenia such as patients who are HIV-seropositive. If ANC decreases to below 750/mm^3 while on treatment, the patient's medication regimen should be re-evaluated and, if the neutropenia persists, consideration should be given to withholding THALOMID if clinically appropriate.
5.9 Thrombocytopenia
Thrombocytopenia, including Grade 3 or 4 occurrences, has been reported in association with the clinical use of THALOMID. Monitor blood counts, including platelet counts. Dose reduction, delay, or discontinuation may be required. Monitor for signs and symptoms of bleeding including petechiae, epistaxis, and gastrointestinal bleeding, especially if concomitant medication may increase the risk of bleeding.

5.10 Increased HIV Viral Load
In a randomized, placebo-controlled trial of thalidomide in an HIV-seropositive patient population, plasma HIV RNA levels were found to increase (median change = 0.42 log_{10} copies HIV RNA/mL, p=0.04 compared to placebo). A similar trend was observed in a second, unpublished study conducted in patients who were HIV-seropositive. The clinical significance of this increase is unknown. Both studies were conducted prior to availability of highly active antiretroviral therapy. Until the clinical significance of this finding is further understood, in HIV-seropositive patients, viral load should be measured after the first and third months of treatment and every 3 months thereafter.

5.11 Bradycardia
Bradycardia in association with THALOMID use has been reported. Cases of bradycardia have been reported, some required medical interventions. The clinical significance and underlying etiology of the bradycardia noted in some THALOMID-treated patients are presently unknown. Monitor patients for bradycardia and syncope. Dose reduction or discontinuation may be required.

Medications known to decrease heart rate should be used with caution in patients receiving THALOMID [see Drug Interactions (7.2)].

5.12 Severe Cutaneous Reactions
Severe cutaneous reactions including Stevens-Johnson syndrome (SJS), toxic epidermal necrolysis (TEN), and drug reaction with eosinophilia and systemic symptoms (DRESS) have been reported with THALOMID use. DRESS may present with a cutaneous reaction (such as rash or exfoliative dermatitis), eosinophilia, fever, and/or lymphadenopathy with systemic complications such as hepatitis, nephritis, pneumonitis, myocardiitis, and/or pericarditis. These events can be fatal. THALOMID interruption or discontinuation should be considered for Grade 2-3 skin rash. Discontinue THALOMID for Grade 4 rash, exfoliative or bullous rash, or for other severe cutaneous reactions such as SJS, TEN, or DRESS, and do not resume therapy [see Dosage and Administration (2.4)].

5.13 Seizures
Although not reported from pre-marketing controlled clinical trials, seizures, including grand mal convulsions, have been reported during post-approval use of THALOMID in clinical practice. Because these events are reported voluntarily from a population of unknown size, estimates of frequency cannot be made. Most patients had disorders that may have predisposed them to seizure activity, and it is not currently known whether THALOMID has any epileptogenic influence. During therapy with THALOMID, patients with a history of seizures or with other risk factors for the development of seizures should be monitored closely for clinical changes that could precipitate acute seizure activity.

5.14 Tumor Lysis Syndrome
Monitor patients at risk of tumor lysis syndrome (e.g., patients with high tumor burden prior to treatment) and take appropriate precautions.

5.15 Contraceptive Risks
Some contraceptive methods may pose a higher risk of adverse effects or may be medically contraindicated in some patients treated with THALOMID. Because some patients may develop sudden, severe neutropenia and/or thrombocytopenia, use of an intrauterine device (IUD) or implantable contraception in these patients may carry an increased risk for infection or bleeding either at insertion, removal or during use. Treatment with THALOMID, the presence of an underlying malignancy, and/or use of an estrogen-containing contraceptive can each increase the risk of thromboembolism. It is not known if these risks of thromboembolism are additive. However, they should be taken into consideration when choosing contraceptive methods.

5.16 Hypersensitivity
Hypersensitivity, including angioedema and anaphylactic reactions to THALOMID has been reported. Signs and symptoms have included the occurrence of erythematous macular rash, possibly associated with fever, tachycardia, and hypotension, and if severe, may necessitate interruption of therapy. If the reaction recurs when dosing is resumed, THALOMID should be discontinued. Do not resume THALOMID treatment after angioedema and anaphylaxis [see Dosage and Administration (2.4)].

6 ADVERSE REACTIONS
The following clinically significant adverse reactions are described in detail in other labeling sections:

- Teratogenicity [see Boxed Warning, Warnings and Precautions (5.1, 5.2), and Patient Counseling Information (17)]
- Venous and Arterial Thromboembolism [see Boxed Warning, Warnings and Precautions (5.3), and Patient Counseling Information (17)]
- Increased Mortality in Patients with MM When Pembrolizumab Is Added to a THALOMID Analogue and Dexamethasone [see Warnings and Precautions (5.4)]
- Drowsiness and Somnolence [see Warnings and Precautions (5.5)]
- Peripheral Neuropathy [see Warnings and Precautions (5.6)]
- Dizziness and Orthostatic Hypotension [see Warnings and Precautions (5.7)]
- Neutropenia [see Warnings and Precautions (5.8)]
- Thrombocytopenia [see Warnings and Precautions (5.9)]
- Increased HIV Viral Load [see Warnings and Precautions (5.10)]
- Bradycardia [see Warnings and Precautions (5.11)]
- Severe Cutaneous Reactions [see Warnings and Precautions (5.12)]
- Seizures [see Warnings and Precautions (5.13)]
- Tumor Lysis Syndrome [see Warnings and Precautions (5.14)]
- Hypersensitivity [see Warnings and Precautions (5.16)]

6.1 Clinical Trials Experience
Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

Most patients taking THALOMID can be expected to experience adverse reactions.

Adverse Reactions in Multiple Myeloma Controlled Clinical Trials
The safety analyses were conducted in two controlled clinical studies (Study 1 and Study 2). The safety analysis in Study 1 was conducted on 204 patients who received treatment. Table 1 lists the most common adverse reactions (≥10%). The most frequently reported adverse reactions were fatigue, hypocalcemia, edema, constipation, sensory neuropathy, dyspnea, muscle weakness, leukopenia, neutropenia, rash/desquamation, confusion, anorexia, nausea, anxiety/agitation, tremor, fever, weight loss, thrombosis/embolism, neuropathy-motor, weight gain, dizziness, and dry skin.

Twenty-three percent of patients (47/204) discontinued due to adverse reactions; 30% (31/102) from the THALOMID/dexamethasone arm and 16% (16/102) from the dexamethasone alone arm.

Table 1: Adverse Reactions Reported in ≥10% of Patients in the THALOMID/Dexamethasone Arm (Study 1 - Safety Population; N=204)
Table 1: Adverse Reactions Reported in ≥10% of Patients in the THALOMID/Dexamethasone Arm (Study 1 - Safety Population; N=204)

<table>
<thead>
<tr>
<th>Body System Adverse Reaction</th>
<th>THALOMID/Dex* (N=234)</th>
<th>Placebo/Dex (N=232)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade 3/4 n (%)</td>
<td>Grade 3/4 n (%)</td>
</tr>
<tr>
<td>Pain</td>
<td>64 (63)</td>
<td>66 (65)</td>
</tr>
<tr>
<td>Myalgia</td>
<td>17 (17)</td>
<td>14 (14)</td>
</tr>
<tr>
<td>Arthralgia</td>
<td>13 (13)</td>
<td>10 (10)</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>52 (51)</td>
<td>51 (50)</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>43 (42)</td>
<td>32 (31)</td>
</tr>
<tr>
<td>Dermatology/Skin</td>
<td>48 (47)</td>
<td>35 (34)</td>
</tr>
<tr>
<td>Rash/desquamation</td>
<td>31 (30)</td>
<td>18 (18)</td>
</tr>
<tr>
<td>Hiccup</td>
<td>21 (21)</td>
<td>11 (11)</td>
</tr>
<tr>
<td>Hepatic</td>
<td>47 (46)</td>
<td>45 (44)</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>14 (14)</td>
<td>10 (10)</td>
</tr>
<tr>
<td>Muscle weakness</td>
<td>42 (41)</td>
<td>41 (40)</td>
</tr>
<tr>
<td>Muscle weakness</td>
<td>41 (40)</td>
<td>38 (37)</td>
</tr>
</tbody>
</table>

* All adverse reactions reported in ≥10% of patients in THALOMID/dexamethasone arm and with a ≥1% difference in the THALOMID/dexamethasone arm compared to the placebo/dexamethasone arm.

The safety analysis in Study 2 was conducted on 466 patients who received treatment. Table 2 lists the most common adverse reactions (≥10%) that were observed. The adverse reactions most often reported by patients treated with THALOMID/dexamethasone were constipation, peripheral edema, tremor, asthenia, dizziness and fatigue. Adverse reactions with a frequency at least 2-fold higher in the THALOMID/dexamethasone group than in the placebo/dexamethasone group include vertigo, confusional state, and anxiety.

Twenty-six percent of patients (121/466) discontinued due to adverse reactions; 37% (86/234) from the THALOMID/dexamethasone arm and 15% (35/232) from the placebo/dexamethasone arm.

Table 2: Adverse Reactions Reported in ≥10% of Patients in the THALOMID/Dexamethasone Arm (Study 2 - Safety Population; N=466)

<table>
<thead>
<tr>
<th>Body System Adverse Reaction</th>
<th>THALOMID/Dex (N=234)*</th>
<th>Placebo/Dex (N=232)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nervous System Disorders</td>
<td>161 (69)</td>
<td>138 (60)</td>
</tr>
<tr>
<td>Edema peripheral</td>
<td>80 (34)</td>
<td>57 (25)</td>
</tr>
<tr>
<td>Asthenia</td>
<td>56 (24)</td>
<td>47 (20)</td>
</tr>
<tr>
<td>Fatigue</td>
<td>50 (21)</td>
<td>36 (16)</td>
</tr>
<tr>
<td>Edema NOS</td>
<td>31 (13)</td>
<td>19 (8)</td>
</tr>
<tr>
<td>Gastrointestinal Disorders</td>
<td>162 (69)</td>
<td>149 (64)</td>
</tr>
<tr>
<td>Constipation</td>
<td>116 (50)</td>
<td>49 (21)</td>
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<tr>
<td>Nausea</td>
<td>30 (13)</td>
<td>27 (12)</td>
</tr>
<tr>
<td>Dyspepsia</td>
<td>27 (11)</td>
<td>21 (9)</td>
</tr>
<tr>
<td>Vascular Disorders</td>
<td>19 (8)</td>
<td>8 (3)</td>
</tr>
<tr>
<td>Blurred vision</td>
<td>5 (2)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Vertigo</td>
<td>6 (3)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

* All adverse reactions reported in ≥10% of patients in THALOMID/dexamethasone arm and with a ≥1% difference in patients between the THALOMID/dexamethasone arm compared to the placebo/dexamethasone arm. NOS = not otherwise specified.

Table 3: Grade 3/4 Adverse Reactions Reported in >2% of Patients in the THALOMID/Dexamethasone Arm (Study 2 - Safety Population; N=466)

<table>
<thead>
<tr>
<th>Body System Adverse Reaction</th>
<th>THALOMID/Dex (N=234)*</th>
<th>Placebo/Dex (N=232)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infections and Infestations</td>
<td>50 (21)</td>
<td>36 (16)</td>
</tr>
<tr>
<td>Pneumonia NOS</td>
<td>17 (7)</td>
<td>14 (6)</td>
</tr>
<tr>
<td>Bronchopneumonia NOS</td>
<td>7 (3)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>General Disorders and Administration Site Conditions</td>
<td>44 (19)</td>
<td>26 (11)</td>
</tr>
<tr>
<td>Asthenia</td>
<td>11 (5)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Metabolism and Nutrition Disorders</td>
<td>33 (14)</td>
<td>34 (15)</td>
</tr>
<tr>
<td>Hypokalemia</td>
<td>7 (3)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Nervous System Disorders</td>
<td>47 (20)</td>
<td>20 (9)</td>
</tr>
<tr>
<td>Vascular Disorders</td>
<td>42 (18)</td>
<td>14 (6)</td>
</tr>
<tr>
<td>Cardiac Disorders</td>
<td>35 (15)</td>
<td>27 (11)</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>11 (5)</td>
<td>8 (3)</td>
</tr>
<tr>
<td>Myocardial ischemia</td>
<td>6 (3)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Cardiac Disorders</td>
<td>35 (15)</td>
<td>27 (11)</td>
</tr>
<tr>
<td>Asthenia</td>
<td>11 (5)</td>
<td>8 (3)</td>
</tr>
<tr>
<td>Myocardial ischemia</td>
<td>6 (3)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Vascular Disorders</td>
<td>42 (18)</td>
<td>14 (6)</td>
</tr>
<tr>
<td>Deep vein thrombosis</td>
<td>27 (12)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Gastrointestinal Disorders</td>
<td>26 (11)</td>
<td>22 (10)</td>
</tr>
<tr>
<td>Constipation</td>
<td>7 (3)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Weight increased</td>
<td>8 (3)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Blood and Lymphatic System Disorders</td>
<td>24 (10)</td>
<td>17 (7)</td>
</tr>
<tr>
<td>Neutropenia</td>
<td>8 (3)</td>
<td>6 (3)</td>
</tr>
<tr>
<td>Respiratory, Thoracic, and Mediastinal Disorders</td>
<td>27 (12)</td>
<td>13 (6)</td>
</tr>
<tr>
<td>Pulmonary embolism</td>
<td>16 (7)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Psychiatric Disorders</td>
<td>19 (8)</td>
<td>8 (3)</td>
</tr>
<tr>
<td>Anxiety</td>
<td>5 (2)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Confusional state</td>
<td>5 (2)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Ear and Labyrinth Disorders</td>
<td>6 (3)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

* All Grade 3/4 adverse reactions with >2% of patients in THALOMID/dexamethasone arm and with a higher frequency in the THALOMID/dexamethasone arm compared to the placebo/dexamethasone arm.

Less Common Adverse Reactions in Multiple Myeloma Controlled Clinical Trials

In Study 2, THALOMID in combination with dexamethasone in patients with multiple myeloma, the following adverse reactions not described above were reported:

- **Gastrointestinal disorders:** Vomiting NOS, dry mouth, peritonitis, diverticular perforation
- **Nervous system disorders:** Somnolence, hypoesthesia, polyneuropathy NOS, transient ischemic attack
- **Respiratory, thoracic, and mediastinal disorders:** Bronchitis NOS
- **Psychiatric disorders:** Mood alteration NOS
- **Vascular disorders:** Hypotension NOS

**Cardiac disorders:** Bradycardia NOS

**Eye disorders:** Blurred vision

*All adverse reactions with ≥3% of patients in THALOMID/dexamethasone arm and with a ≥1% difference in proportion of patients between the THALOMID/dexamethasone arm compared to the placebo/dexamethasone arm. All grade 3/4 and serious adverse reactions reported >2 patients in THALOMID/dexamethasone arm and with a percentage higher in the THALOMID/dexamethasone arm compared to the placebo/dexamethasone arm have been considered for possible inclusion. In any cases medical judgment has been applied for consideration of causality assessment.

Adverse Reactions in Erythema Nodosum Leprosum (ENL) Clinical Trials

Table 4 lists treatment-emergent signs and symptoms that occurred in THALOMID-treated patients in clinical trials in ENL. The most common adverse reactions (≥10%) reported in patients with ENL were somnolence, rash, headache. Doses ranged from 50 to 300 mg/day. All adverse reactions were mild to moderate in severity, and none resulted in discontinuation.

<table>
<thead>
<tr>
<th>Body System Adverse Reaction</th>
<th>THALOMID/Dex (N=331)*</th>
<th>Placebo/Dex (N=232)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nervous System Disorders</td>
<td>161 (69)</td>
<td>138 (60)</td>
</tr>
<tr>
<td>Edema central</td>
<td>80 (34)</td>
<td>57 (25)</td>
</tr>
<tr>
<td>Asthenia</td>
<td>56 (24)</td>
<td>47 (20)</td>
</tr>
<tr>
<td>Fatigue</td>
<td>50 (21)</td>
<td>36 (16)</td>
</tr>
<tr>
<td>Edema NOS</td>
<td>31 (13)</td>
<td>19 (8)</td>
</tr>
<tr>
<td>Gastrointestinal Disorders</td>
<td>162 (69)</td>
<td>149 (64)</td>
</tr>
<tr>
<td>Constipation</td>
<td>116 (50)</td>
<td>49 (21)</td>
</tr>
<tr>
<td>Nausea</td>
<td>30 (13)</td>
<td>27 (12)</td>
</tr>
<tr>
<td>Dyspepsia</td>
<td>27 (11)</td>
<td>21 (9)</td>
</tr>
<tr>
<td>Nervous System Disorders</td>
<td>19 (8)</td>
<td>8 (3)</td>
</tr>
<tr>
<td>Anxiety</td>
<td>5 (2)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Confusional state</td>
<td>5 (2)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Ear and Labyrinth Disorders</td>
<td>6 (3)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

* All adverse reactions reported in ≥10% of patients in THALOMID/dexamethasone arm and with a ≥1% difference in proportion of patients between the THALOMID/dexamethasone arm compared to the placebo/dexamethasone arm. NOS = not otherwise specified.
### Table 4: Summary of Adverse Reactions (ARs) Reported in Controlled Clinical Trials

<table>
<thead>
<tr>
<th>Body System/Adverse Reaction</th>
<th>THALOMID 50 to 300 mg/day (N=24) n (%)</th>
<th>THALOMID 100 mg/day (N=36) n (%)</th>
<th>THALOMID 200 mg/day (N=52) n (%)</th>
<th>Placebo (N=35) n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blood and Lymphatic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anemia</td>
<td>0</td>
<td>2 (6)</td>
<td>4 (13)</td>
<td>3 (9)</td>
</tr>
<tr>
<td>Leukopenia</td>
<td>0</td>
<td>6 (17)</td>
<td>8 (25)</td>
<td>3 (9)</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>0</td>
<td>2 (6)</td>
<td>4 (13)</td>
<td>3 (9)</td>
</tr>
<tr>
<td><strong>Body as a Whole</strong></td>
<td>16 (67)</td>
<td>18 (50)</td>
<td>19 (59)</td>
<td>13 (37)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>1 (4)</td>
<td>1 (3)</td>
<td>1 (3)</td>
<td>4 (11)</td>
</tr>
<tr>
<td>Accidental injury</td>
<td>1 (4)</td>
<td>2 (6)</td>
<td>0</td>
<td>1 (3)</td>
</tr>
<tr>
<td>Asthenia</td>
<td>2 (8)</td>
<td>2 (6)</td>
<td>7 (22)</td>
<td>1 (3)</td>
</tr>
<tr>
<td>Back pain</td>
<td>1 (4)</td>
<td>2 (6)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chills</td>
<td>1 (4)</td>
<td>0</td>
<td>3 (9)</td>
<td>4 (11)</td>
</tr>
<tr>
<td>Facial edema</td>
<td>1 (4)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fever</td>
<td>0</td>
<td>7 (19)</td>
<td>7 (22)</td>
<td>6 (17)</td>
</tr>
<tr>
<td>Headache</td>
<td>3 (13)</td>
<td>6 (17)</td>
<td>6 (19)</td>
<td>4 (11)</td>
</tr>
<tr>
<td>Infection</td>
<td>0</td>
<td>3 (8)</td>
<td>2 (6)</td>
<td>1 (3)</td>
</tr>
<tr>
<td>Malaise</td>
<td>2 (8)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Neck pain</td>
<td>1 (4)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Neck rigidity</td>
<td>1 (4)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pain</td>
<td>2 (8)</td>
<td>0</td>
<td>1 (3)</td>
<td>2 (6)</td>
</tr>
<tr>
<td><strong>Digestive System</strong></td>
<td>16 (64)</td>
<td>16 (44)</td>
<td>15 (43)</td>
<td></td>
</tr>
<tr>
<td>Anorexia</td>
<td>0</td>
<td>1 (3)</td>
<td>3 (9)</td>
<td>2 (6)</td>
</tr>
<tr>
<td>Constipation</td>
<td>1 (4)</td>
<td>1 (3)</td>
<td>3 (9)</td>
<td>0</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>1 (4)</td>
<td>4 (11)</td>
<td>6 (19)</td>
<td>6 (17)</td>
</tr>
<tr>
<td>Dry mouth</td>
<td>0</td>
<td>3 (8)</td>
<td>3 (9)</td>
<td>2 (6)</td>
</tr>
<tr>
<td>Flatulence</td>
<td>0</td>
<td>3 (8)</td>
<td>0</td>
<td>2 (6)</td>
</tr>
<tr>
<td>Liver function tests multiple abnormalities</td>
<td>0</td>
<td>0</td>
<td>3 (9)</td>
<td>0</td>
</tr>
<tr>
<td>Nausea</td>
<td>1 (4)</td>
<td>0</td>
<td>4 (13)</td>
<td>1 (3)</td>
</tr>
<tr>
<td>Oral moniliasis</td>
<td>1 (4)</td>
<td>4 (11)</td>
<td>2 (6)</td>
<td>0</td>
</tr>
<tr>
<td>Tooth pain</td>
<td>1 (4)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Metabolic and Endocrine Disorders</strong></td>
<td>1 (4)</td>
<td>8 (22)</td>
<td>12 (38)</td>
<td>8 (23)</td>
</tr>
<tr>
<td>Edema peripheral</td>
<td>1 (4)</td>
<td>3 (8)</td>
<td>1 (3)</td>
<td>0</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>0</td>
<td>2 (6)</td>
<td>3 (9)</td>
<td>1 (3)</td>
</tr>
<tr>
<td>SGOT increased</td>
<td>0</td>
<td>1 (3)</td>
<td>4 (13)</td>
<td>2 (6)</td>
</tr>
<tr>
<td><strong>Nervous System</strong></td>
<td>13 (54)</td>
<td>19 (53)</td>
<td>18 (56)</td>
<td>12 (34)</td>
</tr>
<tr>
<td>Agitation</td>
<td>0</td>
<td>0</td>
<td>3 (9)</td>
<td>0</td>
</tr>
<tr>
<td>Dizziness</td>
<td>1 (4)</td>
<td>7 (19)</td>
<td>6 (19)</td>
<td>0</td>
</tr>
<tr>
<td>Insomnia</td>
<td>0</td>
<td>0</td>
<td>3 (9)</td>
<td>2 (6)</td>
</tr>
<tr>
<td>Nervousness</td>
<td>0</td>
<td>1 (3)</td>
<td>3 (9)</td>
<td>0</td>
</tr>
<tr>
<td>Neuropathy</td>
<td>0</td>
<td>3 (8)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Paresthesia</td>
<td>0</td>
<td>2 (6)</td>
<td>5 (16)</td>
<td>4 (11)</td>
</tr>
<tr>
<td>Somnolence</td>
<td>9 (38)</td>
<td>13 (36)</td>
<td>12 (38)</td>
<td>4 (11)</td>
</tr>
<tr>
<td>Tremor</td>
<td>1 (4)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vertigo</td>
<td>2 (8)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Respiratory System</strong></td>
<td>3 (13)</td>
<td>9 (25)</td>
<td>6 (19)</td>
<td>9 (26)</td>
</tr>
<tr>
<td>Pharyngitis</td>
<td>1 (4)</td>
<td>3 (8)</td>
<td>2 (6)</td>
<td>2 (6)</td>
</tr>
<tr>
<td>Rhinitis</td>
<td>1 (4)</td>
<td>0</td>
<td>4 (11)</td>
<td>0</td>
</tr>
<tr>
<td>Sinusitis</td>
<td>1 (4)</td>
<td>3 (8)</td>
<td>1 (3)</td>
<td>2 (6)</td>
</tr>
</tbody>
</table>

(Continued)
Blood and Lymphatic: Aplastic anemia, macrocytic anemia, megaloblastic anemia, microcytic anemia.

Body as a Whole: Ascites, AIDS, allergic reaction, cellulitis, chest pain, chills and fever, cyst, decreased CD4 count, facial edema, flu syndrome, hernia, thyroid hormone level altered, moniliasis, photosensitivity reaction, sarcoma, sepsis, viral infection.

Cardiovascular System: Angina pectoris, arhythmia, atrial fibrillation, bradycardia, cerebral ischemia, cerebrovascular accident, congestive heart failure, deep thrombophlebitis, heart arrest, heart failure, hypertension, hypotension, murmurs, mycardial infarct, palpitation, pericarditis, peripheral vascular disorder, postural hypotension, syncope, tachycardia, thrombophlebitis, thrombosis.

Dietary System: Cholangitis, cholestatic jaundice, colitis, dyspepsia, dysphagia, esophagitis, gastroenteritis, gastrointestinal disorder, gastrointestinal hemorrhage, gum disorder, hepatitis, pancreatitis, parotid gland enlargement, periodontitis, stomatitis, tongue discoloration, tooth disorder.

Metabolic and Endocrine: Avitaminosis, bilirubinemia, dehydration, hypercholesterolemia, disorder, hepatitis, pancreatitis, parotid gland enlargement, periodontitis, stomatitis, esophagitis, gastroenteritis, gastrointestinal disorder, gastrointestinal hemorrhage, gum disorder, hepatitis, pancreatitis, parotid gland enlargement, periodontitis, stomatitis, tongue discoloration, tooth disorder.

Muscular Skeletal: Myalgia, myasthenia.

Nervous System: Abnormal gait, ataxia, decreased libido, decreased reflexes, dementia, dysesthesia, dyskinesia, emotional lability, hostility, hypogalactia, hyperkinesia, incoordination, meningitis, neurologic disorder, tremor, vertigo.

Respiratory System: Apnea, bronchitis, lung disorder, lung edema, pneumonia (including Pneumocystis carinii pneumonia), rhinitis.

Skin and Appendages: Angioedema, benign skin neoplasm, eczema, herpes simplex, incomplete Stevens-Johnson syndrome, nail disorder, pruritus, psoriasis, skin discoloration, skin disorder.

Special Senses: Conjunctivitis, eye disorder, lacrimation disorder, retinitis, taste perversion.

6.2 Postmarketing Experience

The following additional adverse reactions have been identified during post approval use of THALOMID and are not already included in Clinical Trials Experience [see Adverse Reactions (6.1)]. Because these reactions are reported voluntarily from a population of uncertain size, it is not possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

Blood and Lymphatic: Decreased white blood cell counts including febrile neutropenia, changes in prothrombin time, pancytopenia, chronic myelogenous leukemia, nodular sclerosing Hodgkin's disease, erythroleukemia, lymphedema, lymphopenia.

Body as a Whole: Hangover effect

Cardiovascular System: Sick sinus syndrome, EKG abnormalities, pulmonary hypertension.

Digestive System: Intestinal perforation, gastrointestinal perforations, bile duct obstruction, stomach ulcer, aphthous, stomatitis.

Ear and Labyrinthine Disorders: Hearing impairment.

Immun System Disorders: Hypersensitivity including anaphylaxis, solid organ transplant rejection.

Infections and infestations: Severe infections (e.g., fatal sepsis including septic shock), viral infections (including varicella zoster virus, cytomegalovirus, and hepatitis B virus reactivation) and progressive multifocal leukoencephalopathy (PML).

Metabolic and Endocrine: Electrolyte imbalance including hypercalcemia, hypernatremia and hypoglycemia, hypothyroidism, increased alkaline phosphatase, tumor lysis syndrome, myxedema.

Nervous System: Changes in mental status or mood including suicide attempts, disturbances in consciousness including lethargy, loss of consciousness or stupor, seizures including grand mal convulsions and status epilepticus, Parkinson's disease, stroke, carpal tunnel, Raynaud's syndrome, migraine, foot drop.

Renal and Urinary Disorders: Renal failure, acute renal failure, oliguria, enuresis.

Reproductive System and Breast Disorders: Amenorrhea, sexual dysfunction, galactorrhea, gynecomastia, metrorrhagia.

Respiratory System: Pleural effusion, interstitial lung disease.

Skin and Appendages: Erythema multiforme, erythema nodosum, toxic epidermal necrolysis (TEN), drug reaction with eosinophilia and systemic symptoms (DRESS), purpura, petaeiae.

Special Senses: Diplopia, nystagmus.

7 DRUG INTERACTIONS

7.1 Opioids, Antihistamines, Antipsychotics, Anti-anxiety Agents, or Other CNS Depressants (Including Alcohol)

The use of opioids, antihistamines, antipsychotics, anti-anxiety agents, or other CNS depressants concomitantly with THALOMID may cause an additive sedative effect and should be avoided.

7.2 Drugs which Cause Bradycardia

The use of drugs which slow cardiac conduction concomitantly with THALOMID may cause an additive bradycardic effect and should be used with caution. Cardiovascular medications which may cause bradycardia include calcium channel blockers, beta blockers, alpha/beta-adrenergic blockers, and digoxin. Non-cardiac drugs that may cause bradycardia include H2 blockers (e.g., famotidine, cimetidine), lithium, tricyclic antidepressants and neuromuscular blockers (succinylcholine).

In 16 healthy men, the pharmacokinetic profile of a single 0.5 mg digoxin dose was similar with and without the coadministration of THALOMID 200 mg/day at steady state levels. The single dose of digoxin had no effect on the pharmacokinetic profile of THALOMID. The safety of long-term concomitant use of THALOMID and digoxin has not been evaluated.

7.3 Drugs which Cause Peripheral Neuropathy

The use of drugs which cause peripheral neuropathy (e.g., bortezomib, amiodarone, cisplatin, doxetaxel, paclitaxel, vincristine, disulfiram, phenytoin, metronidazole, alcohol) can cause an additive effect and should be used with caution.

7.4 Hormonal Contraceptives

Hormonal contraceptives increase the risk of thromboembolism. It is not known whether concomitant use of hormonal contraceptives further increases the risk of thromboembolism with THALOMID.

In 10 healthy women, the pharmacokinetic profiles of norethindrone and ethinyl estradiol following administration of a single dose containing 1.0 mg of norethindrone acetate and 75 mcg of ethinyl estradiol were studied. The results were similar with and without coadministration of THALOMID 200 mg/day at steady-state levels. The single dose of warfarin had no effect on the pharmacokinetic profile of thalidomide.

7.6 Drugs that Interfere with Hormonal Contraceptives

Concomitant use of HIV-protease inhibitors, griseofulvin, modafinil, penicillins, rifampin, rifabutin, phenytoin, carbamazepine, or certain herbal supplements such as St. John’s Wort with hormonal contraceptive agents may reduce the effectiveness of the contraception up to one month after discontinuation of these concomitant therapies. Therefore, females requiring treatment with one or more of these drugs must use two OTHER effective or highly effective methods of contraception while taking THALOMID.

7.7 Concomitant Therapies that May Increase the Risk of Thromboembolism

Erythropoietic agents, or other agents that may increase the risk of thromboembolism, such as estrogen containing therapies, should be used with caution in multiple myeloma patients receiving THALOMID with dexamethasone [see Warnings and Precautions (5.3)].

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Pregnancy Exposure Registry

There is a pregnancy exposure registry that monitors pregnancy outcomes in females exposed to THALOMID during pregnancy as well as female partners of male patients who are exposed to THALOMID. This registry is also used to understand the root cause for the pregnancy. Report any suspected fetal exposure to THALOMID to the FDA via the MedWatch program at 1-800-FDA-1088 and to the REMS Call Center at 1-888-423-5436.

Risk Summary

Based on the mechanism of action [see Clinical Pharmacology (12.1)], human and animal data (see Data), THALOMID can cause embryo-fetal harm when administered to a pregnant female and is contraindicated during pregnancy [see Boxed Warning, Contraindications (4.1), and Warnings and Precautions (5.1)].

THALOMID is a human teratogen, inducing a high frequency of severe and life-threatening birth defects such as amelia (absence of limbs), phocomelia (short limbs), hypoplasticity of the bones, absence of bones, external ear abnormalities (including anotia, microtia, small or absent external auditory canals), facial palsy, eye abnormalities (anophthalmos, microphthalmos), and congenital heart defects. Alimentary tract, urinary tract, and genital malformations have also been documented and mortality at or shortly after birth has been reported in about 40% of infants. Even a single dose taken by a pregnant woman can cause birth defects. If this drug is used during pregnancy, or if the patient becomes pregnant while taking this drug, the patient should be apprised of the potential risk to a fetus.
If pregnancy does occur during treatment, immediately discontinue the drug. Under these conditions, refer the patient to an obstetrician/gynecologist experienced in reproductive toxicity for further evaluation and counseling. Report any suspected fetal exposure to THALOMID to the FDA via the MedWatch program at 1-800-FDA-1088 and also the REMS Call Center at 1-888-423-5436.

Thalidomide crossed the placenta after administration to pregnant hamsters (see Data).

The estimated background risk of major birth defects and miscarriage for the indicated population is unknown. All pregnancies have a background risk of birth defect, loss, or other adverse outcomes. The estimated background risk in the U.S. general population of major birth defects is 2%-4% and of miscarriage is 15%-20% of clinically recognized pregnancies.

Data

Animal Data

A pre- and postnatal reproductive toxicity study was conducted in pregnant female rabbits. Compound-related increased abortion incidences and elevated fetotoxicity were observed at the lowest oral dose level of 30 mg/kg/day (approximately 1.5-fold the maximum human dose based upon BSA) and all higher dose levels. Neonatal mortality was elevated at oral dose levels to the lactating female rabbits >150 mg/kg/day (approximately 7.5-fold the maximum human dose based upon BSA). No delay in postnatal development, including learning and memory functions, were noted at the oral dose level to the lactating female rabbits of 150 mg/kg/day (average thalidomide concentrations in milk ranged from 22 to 36 mcg per mL).

In a study conducted in pregnant rabbits, thalidomide levels in fetal plasma were approximately 11% to 73% of the maternal Cmax. In a study conducted with 14C-thalidomide (150 mg/kg orally) in pregnant hamsters, radioactivity was detected in the embryo, and the relative concentrations of radioactivity in the embryo and maternal plasma were about the same at 4, 12 and 24 hours after dosing. Based on the radioactivity data, thalidomide crossed the placental barrier, and the fetal levels of drug-related material were approximately similar to those of maternal levels.

8.2 Lactation

Risk Summary

There is no information regarding the presence of thalidomide in human milk, the effects of THALOMID on the breastfed child, or the effects of THALOMID on milk production. Thalidomide is excreted in the milk of lactating rabbits (see Data). Because many drugs are excreted in human milk and because of the potential for adverse reactions in a breastfed child from THALOMID, advise women not to breastfeed during treatment with THALOMID.

Data

Animal Data

In lactating female rabbits at an oral dose of 150 mg/kg/day, the average thalidomide concentrations in milk ranged from 22 to 36 mcg per mL. In the study of lactating female rabbits, high concentrations of thalidomide (7741 – 71425 ng per mL) were observed at the lowest oral dose level of 30 mg/kg/day and because of the potential for adverse reactions in a breastfed child from THALOMID, advise women not to breastfeed during treatment with THALOMID.

8.3 Females and Males of Reproductive Potential

Pregnancy Testing

THALOMID can cause fetal harm when administered during pregnancy [see Use in Specific Populations (8.1)]. Verify the pregnancy status of females of reproductive potential prior to initiating THALOMID therapy and during therapy. Advise females of reproductive potential that they must avoid pregnancy 4 weeks before therapy, while taking THALOMID, during dose interruptions and for at least 4 weeks after completing therapy.

Females of reproductive potential must have 2 negative pregnancy tests before initiating THALOMID. The first test should be performed within 10-14 days, and the second test within 24 hours prior to prescribing THALOMID. Once treatment has started and during dose interruptions, pregnancy testing for females of reproductive potential should occur weekly during the first 4 weeks of use, then pregnancy testing should be repeated every 4 weeks in females with regular menstrual cycles. If menstrual cycles are irregular, the pregnancy testing should occur every 2 weeks. Pregnancy testing and counseling should be performed if a patient misses her period or if there is any abnormality in her menstrual bleeding. THALOMID treatment must be discontinued during this evaluation.

Contraception

Females

Females of reproductive potential must commit either to abstain continuously from heterosexual sexual intercourse or to use 2 methods of reliable birth control simultaneously: one highly effective form of contraception – tubal ligation, IUD, hormonal (birth control pills, injections, hormonal patches, vaginal rings, or implants), or partner’s vasectomy, and 1 additional effective contraceptive method – male latex or synthetic condom, diaphragm, or cervical cap. Contraception must begin 4 weeks prior to initiating treatment with THALOMID, during therapy, during dose interruptions, and continuing for 4 weeks following discontinuation of THALOMID therapy. Reliable contraception is indicated even where there has been a history of infertility, unless due to hysterectomy. Females of reproductive potential should be referred to a qualified provider of contraceptive methods, if needed.

Males

Thalidomide is present in the semen of males who take THALOMID. Therefore, males must always use a latex or synthetic condom during any sexual contact with females of reproductive potential while taking THALOMID, during dose interruptions and for up to 28 days after discontinuing THALOMID, even if they have undergone a successful vasectomy. Male patients taking THALOMID must not donate sperm.

Infertility

Based on findings in animals, male fertility may be compromised by treatment with THALOMID [see Nonclinical Toxicology (13.1)].

9 DRUG ABUSE AND DEPENDENCE

Physical and psychological dependence has not been reported in patients taking THALOMID; however, as with other tranquilizers/hypnotics, thalidomide has been reported to result in habituation to its soporific effects.

10 OVERDOSAGE

There is no specific antidote for a THALOMID overdose. In the event of an overdose, the patient’s vital signs should be monitored and appropriate supportive care given to maintain blood pressure and respiratory status.

11 DESCRIPTION

THALOMID, (R)-(N-phthalimido) glutarimide, is an immunomodulatory agent. The empirical formula for thalidomide is C13H10N2O4 and the gram molecular weight is 258.2. The CAS number of thalidomide is 50-35-1.

Chemical Structure of Thalidomide

Thalidomide is an off-white to white, odorless, crystalline powder that is soluble at 25°C in dimethyl sulfoxide and sparingly soluble in water and ethanol. The glutarimide moiety contains a single asymmetric center and, therefore, may exist in either of two optically active forms designated S-(-) or R-(+). THALOMID is an equal mixture of the S-(-) and R-(+) forms and, therefore, has a net optical rotation of zero.

THALOMID is available in 50 mg, 100 mg, 150 mg and 200 mg capsules for oral administration. Active ingredient: thalidomide. Inactive ingredients: pregelatinized starch and magnesium stearate. The 50 mg capsule shell contains gelatin, titanium dioxide, and black ink. The 100 mg capsule shell contains black iron oxide, yellow iron oxide, titanium dioxide, gelatin, and black ink. The 150 mg capsule shell contains FD&C blue #2, black iron oxide, yellow iron oxide, titanium dioxide, gelatin, and black and white ink. The 200 mg capsule shell contains FD&C blue #2, titanium dioxide, gelatin, and white ink.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

The mechanism of action of THALOMID is not fully understood. Cellular activities of thalidomide are mediated through its target cereblon, a component of a cullin ring E3 ubiquitin ligase enzyme complex. THALOMID possesses immunomodulatory, anti-inflammatory and antiangiogenic properties. Available data from in vitro studies and clinical trials suggest that the immunologic effects of this compound can vary substantially under different conditions, but may be related to suppression of excessive tumor necrosis factor-alpha (TNF-α) production and down-modulation of selected cell surface adhesion molecules involved in leukocyte migration. For example, administration of thalidomide has been reported to decrease circulating levels of TNF-α in patients
with erythema nodosum leprosum (ENL); however, it has also been shown to increase plasma TNF-α levels in HIV-seropositive patients. Other anti-inflammatory and immunomodulatory properties of thalidomide may include suppression of macrophage involvement in prostaglandin synthesis, and modulation of interleukin-10 and interleukin-12 production by peripheral blood mononuclear cells. Thalidomide treatment of multiple myeloma patients is accompanied by an increase in the number of circulating natural killer cells, and an increase in plasma levels of interleukin-2 and interferon-γ (T cell-derived cytokines associated with cytotoxic activity). Thalidomide was found to inhibit angiogenesis in a human umbilical artery explant model in vitro. The cellular processes of angiogenesis inhibited by thalidomide may include the proliferation of endothelial cells.

12.3 Pharmacokinetics

Absorption

Absorption of THALOMID is slow after oral administration. The maximum plasma concentrations are reached approximately 2-5 hours after administration. The absolute bioavailability of thalidomide from thalidomide capsules has not yet been characterized in human subjects due to its poor aqueous solubility. Based on the 14C-radiolabeled thalidomide study in human, greater than 90% of the total radioactivity is recovered in urine suggesting good oral absorption. While the extent of absorption (as measured by area under the curve [AUC]) is proportional to dose in healthy subjects, the observed peak concentration (Cmax) increased in a less than proportional manner (see Table 5 below). This lack of Cmax dose proportionality, coupled with the observed increase in Tmax values, suggests that the poor solubility of thalidomide in aqueous media may be hindering the rate of absorption.

Table 5: Pharmacokinetic Parameter Values for THALOMID Mean (%CV)

<table>
<thead>
<tr>
<th>Population/Single Dose</th>
<th>50 mg</th>
<th>200 mg</th>
<th>400 mg</th>
<th>400 mg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AUC0-∞ mcg*h/mL</td>
<td>Cmax mcg/mL</td>
<td>Tmax hrs</td>
<td>Half-life hrs</td>
</tr>
<tr>
<td>Healthy Subjects (n=14)</td>
<td>4.9 (16%)</td>
<td>18.3 (17%)</td>
<td>36.4 (26%)</td>
<td>46.4 (44.1%)</td>
</tr>
<tr>
<td></td>
<td>0.62 (52%)</td>
<td>1.76 (30%)</td>
<td>2.82 (28%)</td>
<td>3.44 (52.6%)</td>
</tr>
<tr>
<td></td>
<td>2.9 (66%)</td>
<td>3.5 (57%)</td>
<td>4.3 (37%)</td>
<td>5.7 (27%)</td>
</tr>
<tr>
<td></td>
<td>5.52 (37%)</td>
<td>5.53 (25%)</td>
<td>7.29 (36%)</td>
<td>6.86 (17%)</td>
</tr>
</tbody>
</table>

Co-administration of THALOMID (thalidomide) with a high-fat meal causes minor (<10%) changes in the observed AUC and Cmax values; however, it causes an increase in Tmax to approximately 6 hours.

Distribution

In human plasma, the geometric mean plasma protein binding was 55% and 66%, respectively, for (+)-(R)- and (-)-(S)-thalidomide. In a pharmacokinetic study of thalidomide in HIV-seropositive adult male subjects receiving thalidomide 100 mg/day, thalidomide was detectable in the semen.

Metabolism

In a 14C-radiolabel ADME study in humans, unchanged drug is the predominant circulating component. Thalidomide is not a substrate of the cytochrome P450 system. At therapeutic concentrations, thalidomide is not an inhibitor or inducer of human cytochrome P450 enzymes in vitro. Pharmacokinetic drug-drug interactions with substrates, inhibitors or inducers of CYP450 are not anticipated.

Elimination

The mean elimination half-life of thalidomide in plasma following single oral doses between 50 mg and 400 mg was 5.5 to 7.3 hours. Following a single 400 mg oral dose of radiolabeled thalidomide, the total mean recovery was 93.6% of the administered dose by Day 8. The majority of the radioactive dose was excreted within 48 hours following dose administration. In humans, 14C-thalidomide is primarily excreted in urine (91.9% of the radioactive dose) mainly as hydrolytic metabolites while fecal excretion is minor (<2% of the dose). Unchanged thalidomide is not eliminated by the kidney to a notable degree (<3.5% of the dose).

Effects of Weight

There is a linear relationship between body weight and estimated thalidomide clearance. In MM patients with body weight from 47-133 kg, thalidomide clearance ranged from approximately 6-12 L/h, representing an increase in thalidomide clearance of 0.605 L/h per 10 kg body weight increase.

Effects of Age, Gender and Race

Analysis of the data from pharmacokinetic studies in healthy volunteers and patients with Hansen’s disease ranging in age from 20 to 69 years does not reveal any age-related changes.

While a comparative trial of the effects of gender on thalidomide pharmacokinetics has not been conducted, examination of the data for thalidomide does not reveal any significant gender differences in pharmacokinetic parameter values.

Pharmacokinetic differences due to race have not been studied.

Pharmacokinetic Data in Special Populations

HIV-seropositive Subjects: There is no apparent significant difference in measured pharmacokinetic parameter values between healthy human subjects and HIV-seropositive subjects following single-dose administration of THALOMID Capsules.

Patients with Hansen’s Disease: Analysis of data from a small study in Hansen’s patients suggests that these patients, relative to healthy subjects, may have an increased bioavailability of THALOMID. The increase is reflected both in an increased area under the curve and in increased peak plasma levels. The clinical significance of this increase is unknown.

Pediatric: No pharmacokinetic data are available in subjects below the age of 18 years.

Patients with Renal Impairment: Renal impairment is not expected to influence drug exposure since <3.5% of the dose is excreted in the urine as unchanged drug.

Patients with Hepatic Impairment: No clinical studies have been conducted in patients with hepatic impairment.

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Two-year carcinogenicity studies were conducted in male and female rats and mice. No compound-related tumorigenic effects were observed at the highest dose levels of 3,000 mg/kg/day to male and female mice (38-fold greater than the highest recommended daily human dose of 400 mg based upon body surface area [BSA]), 3,000 mg/kg/day to female rats (75-fold the maximum human dose based upon BSA), and 300 mg/kg/day to male rats (7.5-fold the maximum human dose based upon BSA).

Thalidomide was neither mutagenic nor genotoxic in the following tests: the Ames bacterial (S. typhimurium and E. coli) reverse mutation assay, a Chinese hamster ovary cell (AS2/XPRT) forward mutation assay, and an in vivo mouse micronucleus test.

Fertility studies were conducted in male and female rabbits; no compound-related effects in mating and fertility indices were observed at any oral thalidomide dose level including the highest of 100 mg/kg/day to female rabbits and 500 mg/kg/day to male rabbits (approximately 9- and 25-fold the maximum human dose, respectively, based upon BSA). Testicular pathological and histopathological effects (classified as slight) were seen in male rabbits at dose levels ≥30 mg/kg/day (approximately 1.5-fold the maximum human dose based upon BSA).

14 CLINICAL STUDIES

14.1 Multiple Myeloma (MM)

The efficacy and safety of THALOMID in patients with multiple myeloma were evaluated in two randomized, multi-center studies (Study 1 and Study 2). Study 1 was an open-label study which randomized 207 symptomatic patients with newly diagnosed MM to THALOMID plus dexamethasone (N=103) versus dexamethasone alone (N=104). The THALOMID dose was 200 mg daily and the dexamethasone dose was 40 mg orally once daily on days 1-4, 9-12, and 17-20 every 28 days. Each group was treated for four 28-day cycles.

Study 2 randomized 470 newly diagnosed patients with MM to THALOMID plus dexamethasone (N=235) versus placebo plus dexamethasone (N=235). In the THALOMID/dexamethasone arm, a starting dose of thalidomide 50 mg was escalated to 200 mg/day (cycle 2) once daily for 28 days. Patients in both treatment groups took 40 mg of dexamethasone once daily given on days 1-4, 9-12, and 17-20 (every 28 days). Beginning with Cycle 5, the dose of dexamethasone was reduced to 40 mg once daily on Days 1 to 4 of each cycle. Treatment continued as tolerated until disease progression.

Baseline demographics for both studies are presented in Table 6 and disease characteristics for the study population are summarized in Tables 7 (Study 1) and 8 (Study 2).
Table 6: Baseline Patient Demographics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>Median</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>37-83</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>53 (51)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>50 (49)</td>
</tr>
<tr>
<td>Race</td>
<td>Caucasian</td>
<td>90 (87)</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>11 (11)</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1 (1)</td>
</tr>
</tbody>
</table>

1 Missing information in Study 1 for 1 patient in the Dex alone group
2 Missing information in Study 1 for 1 patient per arm
3 Black/Hispanic [1 (0.4%)], Hispanic [2 (0.9%)], Hispanic/White [1 (0.4%)], Other [0 (0.0%)]
4 Hispanic [1 (0.4%)], Asian/Pacific Islander [2 (0.9%)], Other [1 (0.4%)]

Table 7: Baseline Disease Characteristics (Study 1)

<table>
<thead>
<tr>
<th>Disease Characteristic</th>
<th>THALOMID/Dexamethasone (N=103)</th>
<th>Dexamethasone alone (N=104)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage (Durie-Salmon), N (%)</td>
<td>1</td>
<td>14 (13.6%)</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>47 (45.6%)</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>41 (39.8%)</td>
</tr>
<tr>
<td>Immunoglobulin Type, N (%)</td>
<td>IgA</td>
<td>21 (20.4%)</td>
</tr>
<tr>
<td></td>
<td>IgG</td>
<td>63 (61.2%)</td>
</tr>
<tr>
<td></td>
<td>IgM</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td></td>
<td>Biclonal</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Lytic Lesions</td>
<td>None</td>
<td>28 (27.1%)</td>
</tr>
<tr>
<td></td>
<td>1-3 lesions</td>
<td>24 (23.3%)</td>
</tr>
<tr>
<td></td>
<td>&gt;3 lesions</td>
<td>34 (33.0%)</td>
</tr>
<tr>
<td>Serum Light Chain</td>
<td>Kappa</td>
<td>59 (57.3%)</td>
</tr>
<tr>
<td></td>
<td>Lambda</td>
<td>28 (27.2%)</td>
</tr>
</tbody>
</table>

1 Missing information for 1 patient in Thal + Dex arm
2 Missing information for 19 patients in Thal + Dex arm and 20 patients in Dex alone arm
3 Missing information for 17 patients in Thal + Dex arm and 30 patients in Dex alone arm
4 Missing information for 16 patients in Thal + Dex arm and 11 patients in Dex alone arm

In Study 1, response rate was the primary endpoint. Response rates based on serum or urine paraprotein measurements were significantly higher in the combination arm (52% vs. 36%). The primary efficacy endpoint in Study 2 was time to progression (TTP), defined as the time from randomization to the first documentation of disease progression, based on the myeloma response criteria. A preplanned interim analysis for Study 2 demonstrated that the combination of THALOMID plus dexamethasone was superior to placebo plus dexamethasone with respect to TTP (Table 9).

Table 8: Baseline Disease Characteristics (Study 2)

<table>
<thead>
<tr>
<th>Disease Characteristic</th>
<th>THALOMID/Dexamethasone (N=235)</th>
<th>Placebo/Dexamethasone (N=235)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline MM Stage (Durie-Salmon), n (%)</td>
<td>I</td>
<td>2 (1)</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>76 (33)</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>157 (69)</td>
</tr>
<tr>
<td>ECOG Performance Status, n (%)</td>
<td>0</td>
<td>40 (17)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>124 (53)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>70 (30)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0 (0)</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>1 (&lt;1)</td>
</tr>
<tr>
<td>Bone Marrow Aspirate/Biopsy Cellularity, n (%)</td>
<td>Present</td>
<td>185 (79)</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>49 (21)</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>1 (&lt;1)</td>
</tr>
<tr>
<td>Baseline β-2 Microglobulin, n (%)</td>
<td>≤2.5 mg/L</td>
<td>33 (14)</td>
</tr>
<tr>
<td></td>
<td>&gt;2.5 mg/L</td>
<td>200 (85)</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>2 (1)</td>
</tr>
</tbody>
</table>

1 Missing information for 1 patient in Thal + Dex arm
2 Missing information for 19 patients in Thal + Dex arm and 20 patients in Dex alone arm
3 Missing information for 17 patients in Thal + Dex arm and 30 patients in Dex alone arm
4 Missing information for 16 patients in Thal + Dex arm and 11 patients in Dex alone arm

Table 9: Summary of Efficacy (Study 2)

<table>
<thead>
<tr>
<th>Time to Progression</th>
<th>Thalidomide/Dexamethasone (N=235)</th>
<th>Placebo/Dexamethasone (N=235)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progressed – n (%)</td>
<td>72 (31)</td>
<td>126 (54)</td>
</tr>
<tr>
<td>Median (Weeks) (95% CI)</td>
<td>97.7 (61.86, NR)</td>
<td>28.3 (27.71, 36.43)</td>
</tr>
<tr>
<td>Hazard Ratio (95% CI)</td>
<td>0.43 (0.32, 0.56)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Overall Survival</td>
<td>Death–n (%)</td>
<td>57 (24)</td>
</tr>
<tr>
<td>Median (Weeks) (95% CI)</td>
<td>NR (112.14, NR)</td>
<td>128.6 (113.43, NR)</td>
</tr>
<tr>
<td>Hazard Ratio (95% CI)</td>
<td>0.82 (0.57, 1.16)</td>
<td>0.82 (0.57, 1.16)</td>
</tr>
</tbody>
</table>

1 The 95% confidence intervals about the median overall TTP, or median overall survival. CI: confidence interval; NR: not reached.
2 Based on a proportional hazards model comparing the hazard functions associated with treatment groups (thalidomide/dexamethasone:placebo/dexamethasone).
3 P-value based on the interim analysis was compared with the nominal significance level of 0.0027. Based on a one-sided unstratified log rank test of survival curve differences between treatment groups.
4 Disease response assessments were determined according to the Bladé criteria. Response is the highest assessment of response during the treatment phase of the study.

The Kaplan-Meier plot of the time to progression by treatment group is presented in Figure 1.
ENL with thalidomide. Thirty-two other published studies containing over 1600 patients consistently report generally successful treatment of the cutaneous manifestations of moderate to severe ENL with thalidomide, generally at 100 mg daily. Response rates and safety profiles were similar. Twenty U.S. patients between the ages of 11 and 17 years were treated with thalidomide, with repeated relapse upon drug withdrawal and remission with reinstitution of therapy.

Data on the efficacy of thalidomide in prevention of ENL relapse were derived from a retrospective evaluation of 102 patients treated under the auspices of the U.S. Public Health Service. A subset of patients with ENL controlled on thalidomide demonstrated chronic ENL treated with 100 mg thalidomide or placebo (three times daily). All patients controlled, crossover trials in a total of 10 hospitalized, steroid-dependent patients with ENL: Cutaneous Response.

### Table 10: Double-Blind, Controlled Clinical Trials of Thalidomide in Patients with ENL: Cutaneous Response

<table>
<thead>
<tr>
<th>Reference</th>
<th>No. of Patients</th>
<th>No. Treatment Courses*</th>
<th>Percent Responding**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iyer et al. Bull World Health Organization 1971:45:719</td>
<td>92</td>
<td>204</td>
<td>Thalidomide 75% Aspirin 25%</td>
</tr>
</tbody>
</table>

* In patients with cutaneous lesions  
**Iyer: Complete response or lesions absent  
**Sheskin: Complete improvement + "striking" improvement (i.e., >50% improvement)

Waters reported the results of two studies, both double-blind, randomized, placebo-controlled, crossover trials in a total of 10 hospitalized, steroid-dependent patients with chronic ENL treated with 100 mg thalidomide or placebo (three times daily). All patients also received dapsone. The primary endpoint was reduction in weekly steroid dosage.

### Table 11: Double-Blind, Controlled Trial of Thalidomide in Patients with ENL: Reduction in Steroid Dosage

<table>
<thead>
<tr>
<th>Reference</th>
<th>Duration of Treatment</th>
<th>No. of Patients</th>
<th>Number Responding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waters</td>
<td>4 weeks</td>
<td>9</td>
<td>4/5 0/4</td>
</tr>
<tr>
<td>Lap Rev 1971:42:26</td>
<td>6 weeks (crossover)</td>
<td>8</td>
<td>8/8 1/8</td>
</tr>
</tbody>
</table>

Data on the efficacy of thalidomide in prevention of ENL relapse were derived from a retrospective evaluation of 102 patients treated under the auspices of the U.S. Public Health Service. A subset of patients with ENL controlled on thalidomide demonstrated repeated relapse upon drug withdrawal and remission with reinstitution of therapy.

Twenty U.S. patients between the ages of 11 and 17 years were treated with thalidomide, generally at 100 mg daily. Response rates and safety profiles were similar to that observed in the adult population.

Thirty-two other published studies containing over 1600 patients consistently report generally successful treatment of the cutaneous manifestations of moderate to severe ENL with thalidomide.
Increased HIV Viral Load
Inform HIV seropositive patients of the risk of increased viral load and the need to monitor viral load [see Warnings and Precautions (5.10)].

Bradycardia
Inform patients of the risk of bradycardia and report signs and symptoms associated with this event to their healthcare provider for evaluation [see Warnings and Precautions (5.11)].

Severe Cutaneous Reactions
Inform patients of the potential risk for severe skin reactions such as SJS, TEN and DRESS and report any signs and symptoms associated with these events to their healthcare provider for evaluation [see Warnings and Precautions (5.12)].

Seizures
Inform patients of the risk of seizures and report any seizure while taking THALOMID [see Warnings and Precautions (5.13)].

Tumor Lysis Syndrome
Inform patients of the potential risk of tumor lysis syndrome and report any signs and symptoms associated with this event to their healthcare provider for evaluation [see Warnings and Precautions (5.14)].

Contraceptive Risks
Inform patients that some contraceptive methods may pose a higher risk of adverse effects or may be medically contraindicated in some patients treated with THALOMID [see Warnings and Precautions (5.15), Drug Interactions (7.4, 7.7)].

Hypersensitivity
Inform patients of the potential for severe hypersensitivity reactions such as angioedema and anaphylaxis to THALOMID. Instruct patients to contact their healthcare provider right away for signs of a skin reaction. Advise patients to seek emergency medical attention for signs or symptoms of severe hypersensitivity reactions [see Warnings and Precautions (5.16)].

Venous and Arterial Thromboembolism
Inform patients of the potential risk of developing venous thromboembolism (such as DVT and PE), ischemic heart disease (including myocardial infarction), and stroke, and discuss the need for appropriate prophylactic treatment [see Boxed Warning and Warnings and Precautions (5.3)].

Drowsiness and Somnolence
Inform patients of the risk of drowsiness and somnolence with the drug and to avoid situations where drowsiness or somnolence may be a problem and not to take other medications that may cause drowsiness or somnolence without adequate medical advice [see Warnings and Precautions (5.5)].

Peripheral Neuropathy
Inform patients of the risk of peripheral neuropathy and report the signs and symptoms associated with this event to their health care provider for further evaluation [see Warnings and Precautions (5.6)].

Dizziness and Orthostatic Hypotension
Inform patients of the risk of dizziness and orthostatic hypotension with the drug. Inform patients to sit upright for a few minutes prior to standing [see Warnings and Precautions (5.7)].

Neutropenia
Inform patients on the risk of developing neutropenia and the need to monitor their white blood cell count [see Warnings and Precautions (5.8)].

Thrombocytopenia
Inform patients of the risk of developing thrombocytopenia and the need to monitor their platelet count [see Warnings and Precautions (5.9)].

• All patients must be instructed to not donate blood while taking THALOMID and for 4 weeks following discontinuation of THALOMID [see Warnings and Precautions (5.1)].

THALOMID® (thalidomide) REMS Program
Because of the risk of embryo-fetal toxicity, THALOMID is only available through a restricted program called the THALOMID REMS program [see Warnings and Precautions (5.2)].

• Patients must sign a Patient-Physician Agreement Form and comply with the requirements to receive THALOMID. In particular, females of reproductive potential must comply with the pregnancy testing, contraception requirements and participate in monthly telephone surveys. Males must comply with the contraception requirements [see Use in Specific Populations (8.3)].

• THALOMID is available only from pharmacies that are certified in THALOMID REMS program. Provide patients with the telephone number and website for information on how to obtain the product.

Pregnancy Exposure Registry
Inform females there is a Pregnancy Exposure Registry that monitors pregnancy outcomes in females exposed to THALOMID during pregnancy and that they can contact the Pregnancy Exposure Registry by calling 1-888-423-5436 [see Use in Specific Populations (8.1)].

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THALOMID® (thalidomide)

THALOMID® (thalidomide)

THALOMID® (thalidomide)
What is the most important information I should know about THALOMID?

Before you begin taking THALOMID, you must read and agree to all of the instructions in the THALOMID REMS® program. For more information, call 1-888-423-5436 or go to www.thalomidrems.com. Before prescribing THALOMID, your healthcare provider will explain the THALOMID REMS program to you and have you sign the Patient-Physician Agreement Form.

THALOMID can cause serious side effects including:

- **Severe and life-threatening human birth defects (deformed babies) or death of an unborn baby.** Females who are pregnant or who plan to become pregnant must not take THALOMID.
  
  **Females must not get pregnant:**
  - For at least 4 weeks before starting THALOMID
  - While taking THALOMID
  - During any breaks (interruptions) in your treatment with THALOMID
  - For at least 4 weeks after stopping THALOMID

- **Females who can become pregnant:**
  - Will have pregnancy tests weekly for 4 weeks, then every 4 weeks if your menstrual cycle is regular, or every 2 weeks if your menstrual cycle is irregular.
  - If you miss your period or have unusual bleeding, you will need to have a pregnancy test and receive counseling.
  - Must agree to use two acceptable forms of birth control at the same time, for at least 4 weeks before, while taking, during any breaks (interruptions) in your treatment, and for at least 4 weeks after stopping THALOMID.
  - Talk with your healthcare provider to find out about options for acceptable forms of birth control that you may use to prevent pregnancy before, during, and after treatment with THALOMID.
  - Stop taking THALOMID and call your healthcare provider right away if you have unprotected sex or if you think your birth control has failed.

If you become pregnant while taking THALOMID, stop taking it right away and call your healthcare provider. If your healthcare provider is not available, you should call the REMS Call Center at 1-888-423-5436. Healthcare providers and patients should report all cases of pregnancy to:

- FDA MedWatch at 1-800-FDA-1088, and
- REMS Call Center at 1-888-423-5436

There is a pregnancy exposure registry that monitors the outcomes of females who take THALOMID during pregnancy, or if their male partner takes THALOMID and they are exposed during pregnancy. You can enroll in this registry by calling the REMS Call Center at the phone number listed above.

- **THALOMID can pass into human semen:**
  - Males, including those who have had a vasectomy, must always use a latex or synthetic condom during any sexual contact with a pregnant female or a female that can become pregnant while taking THALOMID, during any breaks (interruptions) in your treatment with THALOMID, and for up to 4 weeks after stopping THALOMID.
  - Do not have unprotected sexual contact with a female who is or could become pregnant. Tell your healthcare provider if you do have unprotected sexual contact with a female who is or could become pregnant.
  - Do not donate sperm while taking THALOMID, during any breaks (interruptions) in your treatment, and for 4 weeks after stopping THALOMID. If a female becomes pregnant with your sperm, the baby may be exposed to THALOMID and may be born with birth defects.

Men, if your female partner becomes pregnant, you should call your healthcare provider right away.

- **Blood clots.** People with multiple myeloma (MM) who take THALOMID may have an increased risk for blood clots in their arteries, veins, and lungs. This risk is even higher if you take the medicine dexamethasone with THALOMID to treat your MM. Heart attacks and strokes may also happen if you take THALOMID with dexamethasone.

Before taking THALOMID, tell your healthcare provider about all the medicines you take. Certain other medicines can also increase your risk for blood clots.

Call your healthcare provider or get medical help right away if you get any of the following during treatment with THALOMID:

- **Signs or symptoms of a blood clot in the lung, arm, or leg may include:** shortness of breath, chest pain, or arm or leg swelling
- **Signs or symptoms of a heart attack may include:** chest pain that may spread to the arms, neck, jaw, back, or stomach area (abdomen), feeling sweaty, shortness of breath, feeling sick or vomiting
- **Signs or symptoms of stroke may include:** sudden numbness or weakness, especially on one side of the body, severe headache or confusion, or problems with vision, speech, or balance
What is THALOMID?
THALOMID is a prescription medicine used:
- to treat people who have been newly diagnosed with multiple myeloma (MM) in combination with the medicine dexamethasone.
- to treat people who have moderate to severe new lesions of leprosy. THALOMID is not used by itself to treat the skin lesions when there is moderate to severe nerve pain.
- as maintenance treatment to prevent and keep the skin lesions of leprosy from coming back (recurring).
It is not known if THALOMID is safe and effective in children under 12 years of age.

Who should not take THALOMID?
Do not take THALOMID if you:
- are pregnant, plan to become pregnant, or become pregnant during treatment with THALOMID. See “What is the most important information I should know about THALOMID?”
- are allergic to thalidomide or any of the ingredients in THALOMID. See the end of this Medication Guide for a complete list of ingredients in THALOMID.

What should I tell my healthcare provider before taking THALOMID?
Before you take THALOMID, tell your healthcare provider about all of your medical conditions, including if you:
- have a history of seizures
- drink alcohol
- plan to have surgery
- are breastfeeding. THALOMID must not be used by females who are breastfeeding. It is not known if THALOMID passes into your breast milk and can harm your baby.

Tell your healthcare provider about all the medicines you take, including prescription and over-the-counter medicines, vitamins, and herbal supplements. THALOMID and other medicines may affect each other, causing serious side effects. Talk with your healthcare provider before taking any new medicines. Certain medicines can affect the way that birth control pills, injections, transdermal systems (patches), or implants work. You could become pregnant. See “What is the most important information I should know about THALOMID?”

How should I take THALOMID?
- Take THALOMID exactly as prescribed and follow all the instructions of the THALOMID REMS program.
- Keep THALOMID in the blister pack until you take your daily dose.
- Swallow THALOMID capsules whole with water.
- THALOMID is taken 1 time each day, at least 1 hour after your evening meal. Bedtime is the preferred time to take THALOMID.
- Do not open or crush THALOMID capsules or handle them any more than needed.
  - If powder from the THALOMID capsule comes in contact with your skin, wash the skin right away with soap and water.
  - If powder from the THALOMID capsule comes in contact with the inside of your eyes, nose, and mouth, flush well with water.
- If you miss a dose of THALOMID and it has been less than 12 hours since your regular time, take it as soon as you remember. If it has been more than 12 hours, just skip your missed dose. Do not take 2 doses at the same time.
- If you take too much THALOMID, call your healthcare provider right away.

What should I avoid while taking THALOMID?
- See “What is the most important information I should know about THALOMID?”
- Females: Do not get pregnant and do not breastfeed while taking THALOMID.
- Males: Do not donate sperm.
- Do not share THALOMID with other people. It may cause birth defects and other serious problems.
- Do not donate blood while you take THALOMID, during any breaks (interruptions) in your treatment, and for 4 weeks after stopping THALOMID. If someone who is pregnant gets your donated blood, her baby may be exposed to THALOMID and may be born with birth defects.
- THALOMID can cause drowsiness and sleepiness. Avoid drinking alcohol, operating machinery, and driving a car when taking THALOMID. Avoid taking other medicines that may cause drowsiness without talking to your healthcare provider first.
What are the possible side effects of THALOMID?

THALOMID can cause serious side effects, including:

- See “What is the most important information I should know about THALOMID?”
- Drowsiness and sleepiness. See “What should I avoid while taking THALOMID?”
- Nerve damage. Nerve damage is common with THALOMID. If the nerve damage is severe, it may not go away. Stop taking THALOMID and call your healthcare provider right away if you have any of these early symptoms of nerve damage in your hands, legs, or feet:
  - numbness
  - tingling
  - pain
  - burning sensation
- Dizziness and decreased blood pressure when changing positions. THALOMID may cause a decrease in your blood pressure, and you may feel dizzy when you go from a lying down or sitting position to standing up. When changing positions, sit upright for a few minutes before standing to help prevent this.
- Decreased white blood cell count. THALOMID can cause decreased white blood cell counts, including neutrophils. Neutrophils are a type of white blood cell that is important in fighting bacterial infections. Your healthcare provider should check your white blood cell count before and regularly while you take THALOMID. If your neutrophils are too low you should not start THALOMID and if they are low during treatment, your dose of THALOMID may need to be changed.
- Decreased platelet count. THALOMID can cause decreased platelet counts. Your healthcare provider should check your platelet count before and regularly while you take THALOMID. If your platelets are too low, your healthcare provider may lower your dose, delay your dose, or completely stop treatment. Tell your healthcare provider if you have signs and symptoms of bleeding such as:
  - small red or purple spots on your body
  - unusual bleeding or bruising
  - nosebleeds
- Increased HIV virus in the blood. If you are HIV positive, your healthcare provider should check your viral load after one month and three months of treatment, then every 3 months after that.
- Slow heartbeat (bradycardia). Tell your healthcare provider if you have a slow heartbeat, fainting, dizziness or shortness of breath.
- Severe skin reactions and severe allergic reactions. Severe skin reactions and severe allergic reactions can happen with THALOMID and may cause death. Call your healthcare provider right away if you develop any of the following signs or symptoms during treatment with THALOMID:
  - a red, itchy, skin rash
  - severe itching
  - peeling of your skin or blisters
  - fever
  - bright red or tar like stools
  - vomiting or coughing up blood
  - nosebleeds
  - swelling of your lips, mouth, tongue, or throat
  - raised red areas on your skin (hives)
  - trouble breathing or swallowing
  - a very fast heartbeat
  - you feel dizzy or faint
- Seizures. Tell your healthcare provider right away if you have a seizure while taking THALOMID.
- Tumor Lysis Syndrome (TLS). TLS is caused by the fast breakdown of cancer cells. TLS can cause kidney failure and the need for dialysis treatment, abnormal heart rhythm, seizure and sometimes death. Your healthcare provider may do blood tests to check you for TLS.
- Birth control risks. Certain birth control methods may pose a higher risk of serious side effects and should not be used in some females. These risks include severe decreased white blood cell counts, low platelet counts, and blood clots. Use of an intrauterine device (IUD) or implantable birth control may also increase your risk of infection or bleeding during insertion, removal or during use of the device.

Your healthcare provider may tell you to decrease your dose, temporarily stop or permanently stop taking THALOMID if you develop certain serious side effects during treatment with THALOMID.

The most common side effects of THALOMID for treatment of multiple myeloma include:

- tiredness
- decreased calcium levels
- swelling of the hands and feet
- constipation
- numbness or tingling
- shortness of breath
- nausea
- anxiety
- decreased energy or strength
- tremor
- fever
- weight loss
● muscle weakness
● low blood counts
● skin rash or peeling. See “Severe skin reactions and severe allergic reactions” above.
● confusion
● decreased appetite

● blood clots
● muscle twitching and cramping
● weight gain
● dizziness
● dry skin

The most common side effects of THALOMID for treatment of leprosy include:

● sleepiness
● rash
● headache

These are not all the possible side effects of THALOMID.
Call your doctor for medical advice about side effects. You may report side effects to the FDA at 1-800-FDA-1088.

How should I store THALOMID?

● Store THALOMID at room temperature between 68°F to 77°F (20°C to 25°C).
● Protect from light.
● Return any unused THALOMID to THALOMID REMS by calling 1-888-423-5346 or your healthcare provider.

Keep THALOMID and all medicines out of the reach of children.

General information about the safe and effective use of THALOMID.
Medicines are sometimes prescribed for purposes other than those listed in a Medication Guide. Do not take THALOMID for conditions for which it was not prescribed. Do not give THALOMID to other people, even if they have the same symptoms you have. It may harm them and may cause birth defects. You can ask your healthcare provider or pharmacist for information about THALOMID that is written for health professionals. For more information, call 1-888-423-5436 or go to www.thalomidrems.com.

What are the ingredients in THALOMID?

Active ingredient: thalidomide

Inactive ingredients: pregelatinized starch and magnesium stearate.

The 50 mg capsule shell contains gelatin, titanium dioxide and black ink.
The 100 mg capsule shell contains black iron oxide, yellow iron oxide, titanium dioxide, gelatin, and black ink.
The 150 mg capsule shell contains FD&C blue #2, black iron oxide, yellow iron oxide, titanium dioxide, gelatin, and black and white ink.
The 200 mg capsule shell contains FD&C blue #2, titanium dioxide, gelatin, and white ink.

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This Medication Guide has been approved by the U.S. Food and Drug Administration.

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