

HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use COSMEGEN safely and effectively. See full prescribing information for COSMEGEN.

COSMEGEN® (dactinomycin for injection), for intravenous use
Initial U.S. Approval: 1964

RECENT MAJOR CHANGES

- Dosage and Administration, Recommended Dosage for Wilms Tumor (2.1) 8/2018
- Dosage and Administration, Recommended Dosage for Ewing Sarcoma (2.3) 8/2018

INDICATIONS AND USAGE

COSMEGEN is an actinomycin indicated for the treatment of:

- adult and pediatric patients with Wilms tumor, as part of a multi-phase, combination chemotherapy regimen. (1.1)
- adult and pediatric patients with rhabdomyosarcoma, as part of a multi-phase, combination chemotherapy regimen. (1.2)
- adult and pediatric patients with Ewing sarcoma, as part of a multi-phase, combination chemotherapy regimen. (1.3)
- adult and pediatric patients with metastatic, nonseminomatous testicular cancer, as part of a multi-phase, combination chemotherapy regimen. (1.4)
- post-menarchal patients with gestational trophoblastic neoplasia, as a single agent or as part of a combination chemotherapy regimen. (1.5)
- adult patients with locally recurrent or locoregional solid malignancies, as a component of palliative or adjunctive regional perfusion. (1.6)

DOSAGE AND ADMINISTRATION

- Wilms Tumor: The recommended dose is 45 mcg/kg intravenously once every 3 to 6 weeks for up to 26 weeks, as part of a multi-agent combination chemotherapy regimen. (2.1)
- Rhabdomyosarcoma: The recommended dose is 15 mcg/kg intravenously once daily for 5 days every 3 to 9 weeks for up to 112 weeks, as part of a multi-agent combination chemotherapy regimen. (2.2)
- Ewing Sarcoma: The recommended dose is 1250 mcg/m² intravenously once every 3 weeks for 51 weeks, as part of a multi-agent combination chemotherapy regimen. (2.3)
- Metastatic Nonseminomatous Testicular Cancer: The recommended dose is 1000 mcg/m² intravenously every 3 weeks, as part of cisplatin-based, multi-drug chemotherapy regimen. (2.4)
- Gestational Trophoblastic Neoplasia:
 - Non-metastatic and Low-risk Metastatic Disease: The recommended dose is 12 mcg/kg intravenously daily for 5 days, as a single agent. (2.5)
 - High-risk Metastatic Disease: The recommended dose is 500 mcg intravenously on Days 1 and 2 every 2 weeks for up to 8 weeks, as part of a multi-agent combination chemotherapy regimen. (2.5)
- Regional Perfusion in Locally Recurrent and Locoregional Solid Malignancies:

- Lower Extremity or Pelvis: The recommend dose is 50 mcg/kg once with melphalan. (2.6)
- Upper Extremity: The recommended dose is 35 mcg/kg once with melphalan. (2.6)

DOSAGE FORMS AND STRENGTHS

For injection: 500 mcg as a lyophilized powder in a single-dose vial. (3)

CONTRAINDICATIONS

None. (4)

WARNINGS AND PRECAUTIONS

- Secondary Malignancy or Leukemia: Increased risk of secondary malignancies following treatment. (5.1)
- Venocclusive Disease: Can cause severe or fatal VOD. Monitor for elevations in AST, ALT, total bilirubin, hepatomegaly, weight gain, or ascites. Consider delaying next dose. (5.2)
- Extravasation: Immediately interrupt the injection or infusion and apply ice. (2.7, 5.3)
- Myelosuppression: Monitor blood cell counts before each cycle. Delay next dose if severe myelosuppression has not improved. (5.4)
- Immunizations: Vaccination with live viral vaccines is not recommended before or during treatment. (5.5)
- Severe Mucocutaneous Reactions: Discontinue treatment (5.6)
- Renal Toxicity: Monitor creatinine and electrolytes frequently. (5.7)
- Hepatotoxicity: Monitor transaminases, alkaline phosphatase and bilirubin prior to and during treatment. (5.8)
- Potentiation of Radiation Toxicity and Radiation Recall: Reduce dose by 50% during concomitant radiation. Use caution when administering within two months of radiation. (5.9)
- Embryo-fetal Toxicity: Can cause fetal harm. Advise patients of the potential risk to a fetus and to use effective contraception. (5.10, 8.1, 8.3)

ADVERSE REACTIONS

Common adverse reactions are: infection, alopecia, rash, dysphagia, fatigue, fever, nausea, vomiting, anemia, neutropenia, thrombocytopenia, mucositis, and hepatotoxicity (6)

To report SUSPECTED ADVERSE REACTIONS, contact Recordati Rare Diseases at 1-800-575-8374 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

USE IN SPECIFIC POPULATIONS

- Lactation: Advise not to breastfeed. (8.2)

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Revised: 8/2018

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FULL PRESCRIBING INFORMATION

1 INDICATIONS AND USAGE

1.1 Wilms Tumor

COSMEGEN is indicated for the treatment of adult and pediatric patients with Wilms tumor, as part of a multi-phase, combination chemotherapy regimen.

1.2 Rhabdomyosarcoma

COSMEGEN is indicated for the treatment of adult and pediatric patients with rhabdomyosarcoma, as part of a multi-phase, combination chemotherapy regimen.

1.3 Ewing Sarcoma

COSMEGEN is indicated for the treatment of adult and pediatric patients with Ewing sarcoma, as part of a multi-phase, combination chemotherapy regimen.

1.4 Metastatic Nonseminomatous Testicular Cancer

COSMEGEN is indicated for the treatment of adult and pediatric patients with metastatic, nonseminomatous testicular cancer, as part of a multi-phase, combination chemotherapy regimen.

1.5 Gestational Trophoblastic Neoplasia

COSMEGEN is indicated for the treatment of post-menarchal patients with gestational trophoblastic neoplasia, as a single agent or as part of a combination chemotherapy regimen.

1.6 Regional Perfusion in Locally Recurrent and Locoregional Solid Malignancies

COSMEGEN is indicated for the treatment of adult patients with locally recurrent or locoregional solid malignancies, as a component of palliative or adjunctive regional perfusion.

2 DOSAGE AND ADMINISTRATION

2.1 Recommended Dosage for Wilms Tumor

The recommended dose of COSMEGEN, as part of a multi-agent combination chemotherapy regimen, is 45 mcg/kg intravenously once every 3 to 6 weeks for up to 26 weeks.

2.2 Recommended Dosage for Rhabdomyosarcoma

The recommended dose of COSMEGEN, as part of a multi-agent combination chemotherapy regimen, is 15 mcg/kg intravenously once daily for 5 days every 3 to 9 weeks for up to 112 weeks.

2.3 Recommended Dosage for Ewing Sarcoma

The recommended dose of COSMEGEN, as part of a multi-agent combination chemotherapy regimen, is 1250 mcg/m² intravenously once every 3 weeks for 51 weeks.

2.4 Recommended Dosage for Metastatic Nonseminomatous Testicular Cancer

The recommended dose of COSEMGEN, as part of a cisplatin-based, multi-agent combination chemotherapy regimen, is 1000 mcg/m² intravenously once every 3 weeks for 12 weeks.

2.5 Recommended Dosage for Gestational Trophoblastic Neoplasia

The recommended dose of COSEMEGEN for nonmetastatic and low-risk metastatic disease is 12 mcg/kg intravenously daily for five days as a single agent.

The recommended dose of COSEMEGEN, as part of a multi-agent combination chemotherapy regimen, for high-risk metastatic disease is 500 mcg intravenously on Days 1 and 2 every 2 weeks for up to 8 weeks.

2.6 Recommended Dosage for Regional Perfusion in Locally Recurrent and Locoregional Solid Malignancies

The recommended dose of COSMEGEN, in combination with melphalan, is 50 mcg/kg once for lower extremity or pelvis.

The recommended dose of COSMEGEN, in combination with melphalan, is 35 mcg/kg once for upper extremity.

Calculate the dose for obese or edematous patients based on ideal body weight.

2.7 Preparation and Administration

- COSMEGEN is a cytotoxic drug. Follow applicable special handling and disposal procedures.¹
- Visually inspect the vials for particulate matter and discoloration, whenever solution and container permit.

Preparation

- Reconstitute each vial by adding 1.1 mL of Sterile Water for Injection without preservative using aseptic techniques.
- The reconstituted product should be a clear, gold-colored solution at a concentration of 500 mcg/mL.
- Further dilute the reconstituted product with 5% Dextrose Injection or 0.9% Sodium Chloride Injection to yield concentrations greater than 10 mcg/mL.
- Store at room temperature for no more than 4 hours from reconstitution to completion of injection or infusion. Discard after 4 hours.
- COSMEGEN does not contain a preservative. Discard any unused portions.

Administration

- Administer the diluted reconstituted product intravenously over 10 to 15 minutes.
- Do not use in-line filters with a cellulose ester membrane.

Management of Extravasation

- Discontinue COSMEGEN for burning or stinging sensation or other evidence indicating perivenous infiltration or extravasation.
- Manage confirmed or suspected extravasation as follows:
 - Terminate the injection or infusion immediately and restart in another vein.

- Intermittent application of ice to the site for 15 minutes 4 times daily for 3 days [*see Warnings and Precautions (5.3)*].

3 DOSAGE FORMS AND STRENGTHS

For injection: 500 mcg as a sterile, amorphous yellow to orange, lyophilized powder in a single-dose vial.

4 CONTRAINDICATIONS

None.

5 WARNINGS AND PRECAUTIONS

5.1 Secondary Malignancy or Leukemia

The risk of developing secondary malignancies, including leukemia, is increased following treatment with COSMEGEN.

5.2 Venous-occlusive Disease

Severe and fatal hepatic venous-occlusive disease (VOD) can occur with COSMEGEN. Risk factors for the development of VOD include age younger than 4 years or concomitant radiotherapy. After treatment with COSMEGEN, monitor frequently for signs and symptoms of VOD; these include elevations in AST, ALT, total bilirubin, hepatomegaly, weight gain, or ascites. If patients develop VOD, considering delaying next dose of COSMEGEN. Resume, reduce dose or permanently discontinue based on severity of reaction and disease being treated.

5.3 Extravasation

Extravasation of COSMEGEN can result in severe local tissue injury manifesting as blistering, ulcerations and persistent pain requiring wide excision surgery followed by split-thickness skin grafting. If any signs or symptoms of extravasation occur, immediately interrupt the injection or infusion. Apply ice to the site intermittently for 15 minutes, 4 times a day for 3 days [*see Dosage and Administration (2.7)*]. Observe closely and consult plastic surgery if necessary based on severity of reaction.

5.4 Myelosuppression

Severe and fatal myelosuppression, which may include neutropenia, thrombocytopenia and anemia, can occur with COSMEGEN. The nadir in neutrophil counts generally occurs 14 to 21 days after administration. Obtain complete blood counts prior to each treatment cycle. Delay next dose of COSMEGEN if severe myelosuppression has not improved. Consider dose reduction for patients with prolonged myelosuppression based on severity of reaction and disease being treated.

5.5 Immunizations

The safety with live viral vaccines following COSMEGEN has not been studied and vaccination with live virus vaccines is not recommended before or during treatment.

5.6 Severe Mucocutaneous Reactions

Severe mucocutaneous reactions, such as Steven-Johnson syndrome and Toxic Epidermal Necrolysis (TEN), can occur with COSMEGEN. Permanently discontinue COSMEGEN in patients who experience a severe mucocutaneous reaction.

5.7 Renal Toxicity

Abnormalities of renal function can occur with COSMEGEN. Monitor creatinine and electrolytes frequently during COSMEGEN therapy.

5.8 Hepatotoxicity

Hepatotoxicity can occur with COSMEGEN. Monitor AST, ALT, alkaline phosphatase, and bilirubin prior to and during COSMEGEN therapy.

5.9 Potentiation of Radiation Toxicity and Radiation Recall

COSMEGEN can increase radiation-induced gastrointestinal toxicity, myelosuppression, or erythema and vesiculation of the skin or buccal and pharyngeal mucosa. Reduce the dose of COSMEGEN by 50% during concomitant radiation.

Radiation recall, affecting previously treated radiation fields, can occur in patients who receive COSMEGEN after prior radiation therapy. Although the risk can occur with distant radiation exposure, the risk appears highest when COSMEGEN is administered within two months of prior radiation.

5.10 Embryo-Fetal Toxicity

Based on findings from animal studies and its mechanism of action, COSMEGEN can cause fetal harm when administered to a pregnant woman. In animal reproduction studies, administration of dactinomycin to pregnant animals during the period of organogenesis was teratogenic, resulting in malformations at doses lower than the recommended human dose.

Advise pregnant women of the potential risk to the fetus. Advise females of reproductive potential to use effective contraception during treatment with COSMEGEN and for at least 6 months after the final dose. Advise males with female partners of reproductive potential to use effective contraception during treatment with COSMEGEN and for 3 months after the final dose [see *Use in Specific Populations* (8.1, 8.3)].

6 ADVERSE REACTIONS

The following serious adverse reactions are described elsewhere in the labeling:

- Secondary Malignancy and Leukemia [see *Warnings and Precautions* (5.1)]
- Veno-occlusive Disease [see *Warnings and Precautions* (5.2)]
- Extravasation [see *Warnings and Precautions* (5.3)]
- Myelosuppression [see *Warnings and Precautions* (5.4)]
- Immunizations [see *Warning and Precautions* (5.5)]
- Severe Mucocutaneous Reactions [see *Warnings and Precautions* (5.6)]
- Renal Toxicity [see *Warnings and Precautions* (5.7)]
- Hepatotoxicity [see *Warnings and Precautions* (5.8)]

- Potentiation of Radiation Toxicity and Radiation Recall [*see Warnings and Precautions (5.9)*]

Common adverse reactions are: infection, alopecia, rash, dysphagia, fatigue, fever, nausea, vomiting, anemia, neutropenia, thrombocytopenia, mucositis, and hepatotoxicity.

The following adverse reactions have been identified in clinical studies or postmarketing reports. Because some of these reactions were reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

Infections: infections including sepsis with fatal outcome

Hematologic: anemia, leukopenia, thrombocytopenia, pancytopenia, reticulocytopenia, neutropenia, febrile neutropenia, disseminated intravascular coagulation

Immune system: hypersensitivity

Metabolism and nutrition: anorexia, hypocalcemia, tumor lysis syndrome

Nervous system: peripheral neuropathy

Ocular: optic neuropathy

Vascular: thrombophlebitis, hemorrhage

Respiratory, thoracic and mediastinal: pneumonitis, pneumothorax

Gastrointestinal: nausea, vomiting, abdominal pain, diarrhea, constipation, gastrointestinal ulceration, cheilitis, dysphagia, esophagitis, ulcerative stomatitis, ascites, proctitis, mucositis

Hepatobiliary: liver function test abnormalities, hepatomegaly, hepatitis, hepatic failure with reports of death, hepatic veno-occlusive disease

Dermatologic: alopecia, rash, dermatitis, acne, erythema multiforme, Stevens Johnson Syndrome, radiation recall, toxic epidermal necrolysis

Musculoskeletal and connective tissue: myalgia, growth retardation

Renal and urinary: renal impairment, renal failure

General: fatigue, fever, malaise

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Risk Summary

Based on findings from animal studies and its mechanism of action, COSMEGEN can cause fetal harm when administered to a pregnant woman [*see Clinical Pharmacology (12.1)*]. In animal reproduction studies, administration of dactinomycin to pregnant animals during the period of organogenesis was teratogenic, resulting in malformations at doses lower than the recommended human dose (*see Data*). Advise pregnant women of the potential risk to a fetus [*see Use in Special Populations (8.3)*].

In the U.S. general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2% to 4% and 15% to 20%, respectively.

Data

Animal Data

Dactinomycin was teratogenic in animals. Administration of dactinomycin to pregnant rats, rabbits, and hamsters during the period of organogenesis, increased the incidence of fetal malformations and caused embryotoxicity at doses (based on body surface area) as low as 0.2 times the clinical dose of 1250 mcg/m².

8.2 Lactation

Risk Summary

There are no data on the presence of dactinomycin or its metabolites in human milk or their effects on the breastfed infant or on milk production. Because of the potential for serious adverse reactions in breastfed infants from COSMEGEN, advise women not to breastfeed during treatment with COSMEGEN and, based on limited published data regarding the dactinomycin half-life, for 14 days after the final dose.

8.3 Females and Males of Reproductive Potential

Pregnancy Testing

Verify the pregnancy status of females of reproductive potential prior to initiating COSMEGEN [see *Use in Specific Population (8.1)*].

Contraception

COSMEGEN can cause fetal harm when administered to a pregnant woman [see *Use in Specific Populations (8.1)*].

Females

Advise females of reproductive potential to use effective contraception during treatment with COSMEGEN and for at least 6 months after the final dose.

Males

Because of the potential for genotoxicity, advise males with female partners of reproductive potential to use effective contraception during treatment with COSMEGEN and for 3 months after the final dose [see *Nonclinical Toxicology (13.1)*].

8.4 Pediatric Use

The safety and effectiveness of dactinomycin have been established in pediatric patients with Wilms tumor, rhabdomyosarcoma, Ewing sarcoma, and metastatic nonseminomatous testicular cancer.

The safety and effectiveness of dactinomycin have been established in post-menarchal pediatric patients with gestational trophoblastic neoplasia.

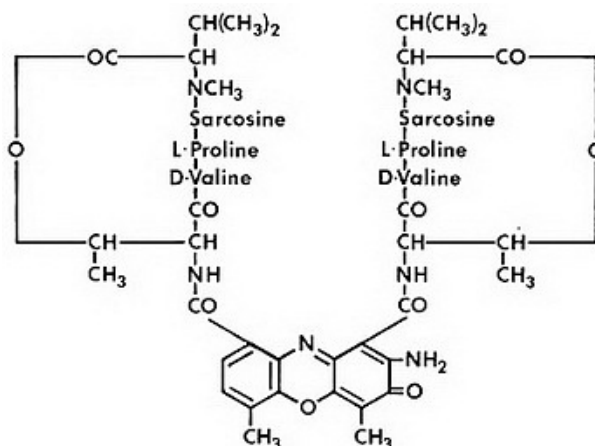
The safety and effectiveness of COSMEGEN have not been established in pediatric patients undergoing regional perfusion for locally recurrent or locoregional solid malignancies.

8.5 Geriatric Use

Clinical studies of COSMEGEN did not include sufficient numbers of subjects aged 65 and over to determine whether they respond differently from younger subjects.

11 DESCRIPTION

Dactinomycin is an actinomycin. Dactinomycin is produced by *Streptomyces parvullus*. The chemical name is 8-amino-N-(2-amino-4,6-dimethyl-3-oxo-phenoxazin-1-yl)carbonyl-N'-[8-amino-4,6-dimethyl-7-oxo-9-[[[3,6,10-trimethyl-7,14-bis(1-methylethyl)-2,5,8,12,15-pentaoxo-9-oxa-3,6,13,16-tetrazabicyclo[14.3.0]nonadec-11-yl]carbamoyl]phenoxazin-1-yl]carbonyl-4,6-dimethyl-7-oxo-N,N'-bis[3,6,10-trimethyl-7,14-bis(1-methylethyl)-2,5,8,12,15-pentaoxo-9-oxa-3,6,13,16-tetrazabicyclo[14.3.0]nonadec-11-yl]-1,9-bis[[[3,6,10-trimethyl-7,14-bis(1-methylethyl)-2,5,8,12,15-pentaoxo-9-oxa-3,6,13,16-tetrazabicyclo[14.3.0]nonadec-11-yl]carbamoyl]phenoxazine-1,9-dicarboxamide. The molecular formula is C₆₂H₈₆N₁₂O₁₆ and the molecular weight is 1255.42 daltons. The structural formula of dactinomycin is shown below:



COSMEGEN (dactinomycin for injection) for intravenous use is a sterile, amorphous yellow to orange, lyophilized powder in a single-dose vial. Each vial contains 500 mcg of dactinomycin and 20 mg of mannitol.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

COSMEGEN is a cytotoxic actinomycin that binds DNA and inhibits RNA synthesis. The cytotoxic activity of dactinomycin has been demonstrated in animal models of different human cancers.

12.2 Pharmacodynamics

Dactinomycin exposure-response relationships and the time course of pharmacodynamics response are unknown.

12.3 Pharmacokinetics

The distribution and excretion of radiolabeled dactinomycin (³H actinomycin D) were assessed in three adult patients with malignant melanoma.

Distribution

³H actinomycin D is concentrated in nucleated cells and does not penetrate the blood-brain barrier.

Elimination

Excretion

Following administration of radiolabeled dactinomycin, approximately 30% was recovered in urine and feces in one week.

Specific Populations

Pediatric Patients

Published studies and population analyses in patients ≤ 21 years of age with cancer report a trend of increasing systemic dactinomycin clearance with increasing body weight.

Drug Interaction Studies

Published in vitro studies report that dactinomycin may be a substrate of the P-glycoprotein and OATP1B3 transporter systems.

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Dactinomycin is a carcinogen in animals. Local sarcomas were produced in mice and rats after repeated subcutaneous or intraperitoneal injections. Mesenchymal tumors occurred in male rats given intraperitoneal injections of 50 mcg/kg, 2 to 5 times per week, for 18 weeks, at doses (based on body surface area) 0.5 times the clinical dose of 1250 mcg/m².

Dactinomycin was mutagenic in several in vitro and in vivo test systems including human fibroblasts and leukocytes, and HeLa cells. DNA damage and cytogenetic effects have been demonstrated in the mouse and the rat.

15 REFERENCES

1. "OSHA Hazardous Drugs." OSHA. <http://www.osha.gov/SLTC/hazardousdrugs/index.html>

16 HOW SUPPLIED/STORAGE AND HANDLING

COSMEGEN (dactinomycin for injection) for intravenous use is supplied as a sterile, amorphous yellow to orange, lyophilized powder in a single-dose vial. Each COSMEGEN vial (NDC 55292-811-55) contains 0.5 mg of dactinomycin and 20 mg of mannitol.

Store at 20 to 25°C (68 to 77°F); excursions permitted between 15 to 30°C (59 to 86°F) [see USP Controlled Room Temperature].

Protect COSMEGEN from light and humidity.

Store the reconstituted COSMEGEN at room temperature for no more than 4 hours from reconstitution to completion of administration [see *Dosage and Administration (2.7)*].

COSMEGEN is a cytotoxic drug. Follow applicable special handling and disposal procedures.¹

17 PATIENT COUNSELING INFORMATION

Secondary Malignancy or Leukemia

Advise patients of the increased risk of secondary malignancies [*see Warnings and Precautions (5.1)*].

Veno-occlusive Disease

Advise patients about the symptoms of VOD and to seek medical attention if they develop new onset jaundice, abdominal distention, or right upper quadrant pain [*see Warnings and Precautions (5.2)*].

Myelosuppression

Advise patients to contact their healthcare provider for any signs or symptoms of myelosuppression or infection [*see Warnings and Precautions (5.4)*].

Severe Mucocutaneous Reactions

Advise patients of the risk of severe mucocutaneous reactions and to contact their health care provided for new skin lesions, mouth sores or oropharyngeal lesions [*see Warnings and Precautions (5.5)*].

Renal Toxicity or Hepatotoxicity

Advise patients of the need for periodic laboratory testing to monitor for renal toxicity and hepatotoxicity [*see Warnings and Precautions (5.7, 5.8)*].

Potentiation of Radiation Toxicity and Radiation Recall

Advise patients of the risk of increased radiation-induced gastrointestinal, myelosuppression and skin toxicity [*see Warnings and Precautions (5.9)*].

Embryo-Fetal Toxicity

Advise females of reproductive potential of the potential risk to a fetus. Advise females to inform their healthcare provider of a known or suspected pregnancy [*see Warnings and Precautions (5.10), Use in Specific Populations (8.1)*].

Advise females of reproductive potential to use effective contraception during treatment with COSMEGEN and for 6 months after final dose [*see Use in Specific Populations (8.3)*].

Advise male patients with female partners of reproductive potential to use effective contraception during treatment with COSMEGEN and for 3 months after final dose [*see Use in Specific Populations (8.3)*].

Lactation

Advise females not to breastfeed during treatment with COSMEGEN and for 14 days after the final dose [*see Use in Specific Populations (8.2)*].

Manufactured by: Baxter Oncology GmbH, 33790 Halle/Westfalen, Germany

Manufactured for: Recordati Rare Diseases Inc., Lebanon, NJ 08833, U.S.A.

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