

# POSFREA- palonosetron injection, solution

## Avyxa Pharma, LLC

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### HIGHLIGHTS OF PRESCRIBING INFORMATION

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

**POSFREA™ (palonosetron) injection, for intravenous use**  
**Initial U.S. Approval: 2003**

### INDICATIONS AND USAGE

POSFREA is a serotonin-3 (5-HT<sub>3</sub>) receptor antagonist indicated in adults for:

- Moderately emetogenic cancer chemotherapy -- prevention of acute and delayed nausea and vomiting associated with initial and repeat courses (1.1)
- Highly emetogenic cancer chemotherapy -- prevention of acute nausea and vomiting associated with initial and repeat courses (1.1)
- Prevention of postoperative nausea and vomiting (PONV) for up to 24 hours following surgery. Efficacy beyond 24 hours has not been demonstrated (1.2)

### DOSAGE AND ADMINISTRATION

Recommended Dosage for Chemotherapy-Induced Nausea and Vomiting (2.1)

- Inject 0.25 mg as a single intravenous dose over 30 seconds.
- Start the dosing approximately 30 minutes before the start of chemotherapy.

Recommended Dosage for Postoperative Nausea and Vomiting (2.1)

- Inject 0.075 mg as a single intravenous dose over 10 seconds immediately before the induction of anesthesia.

### DOSAGE FORMS AND STRENGTHS

Injection:

- 0.25 mg palonosetron in 5 mL (0.05 mg/mL) solution in a single-dose vial (3)
- 0.075 mg palonosetron in 1.5 mL (0.05 mg/mL) solution in a single-dose vial (3)

### CONTRAINDICATIONS

Hypersensitivity to the drug or any of its components (4)

### WARNINGS AND PRECAUTIONS

- Hypersensitivity reactions, including anaphylaxis, have been reported with or without known hypersensitivity to other selective 5-HT<sub>3</sub> receptor antagonists (5.1)
- Serotonin syndrome has been reported with 5-HT<sub>3</sub> receptor antagonists alone but particularly with concomitant use of serotonergic drugs (5.2, 7.1)

### ADVERSE REACTIONS

The most common adverse reactions in chemotherapy-induced nausea and vomiting ( $\geq 5\%$ ) are headache and constipation (6.1)

The most common adverse reactions in postoperative nausea and vomiting ( $\geq 2\%$ ) are QT prolongation, bradycardia, headache, and constipation (6.1).

**To report SUSPECTED ADVERSE REACTIONS, contact Avyxa Pharma, LLC at 1-888-520-0954 or FDA at 1-800-FDA-1088 or [www.fda.gov/medwatch](http://www.fda.gov/medwatch).**

### DRUG INTERACTIONS

Serotonergic Drugs: Monitor for serotonin syndrome; if symptoms occur, discontinue POSFREA and initiate supportive treatment (7.1)

**See 17 for PATIENT COUNSELING INFORMATION and FDA-approved patient labeling.**

**Revised: 7/2024**

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## **FULL PRESCRIBING INFORMATION**

### **1 INDICATIONS AND USAGE**

#### **1.1 Chemotherapy-Induced Nausea and Vomiting in Adults**

POSFREA is indicated for:

- Moderately emetogenic cancer chemotherapy -- prevention of acute and delayed nausea and vomiting associated with initial and repeat courses

- Highly emetogenic cancer chemotherapy -- prevention of acute nausea and vomiting associated with initial and repeat courses

## **1.2 Postoperative Nausea and Vomiting in Adults**

POSFREA is indicated for prevention of postoperative nausea and vomiting (PONV) for up to 24 hours following surgery. Efficacy beyond 24 hours has not been demonstrated.

As with other antiemetics, routine prophylaxis is not recommended in patients in whom there is little expectation that nausea and/or vomiting will occur postoperatively. In patients where nausea and vomiting must be avoided during the postoperative period, POSFREA is recommended even where the incidence of postoperative nausea and/or vomiting is low.

## **2 DOSAGE AND ADMINISTRATION**

### **2.1 Recommended Dosage**

#### Recommended Dosage for Chemotherapy-Induced Nausea and Vomiting

- Inject 0.25 mg as a single intravenous dose over 30 seconds.
- Start the dosing approximately 30 minutes before the start of chemotherapy.

#### Recommended Dosage for Postoperative Nausea and Vomiting

- 0.075 mg as a single intravenous dose over 10 seconds immediately before the induction of anesthesia.

### **2.2 Instructions for Intravenous Administration**

- Do not mix with other drugs.
- Flush the infusion line with 0.9% Sodium Chloride Injection, USP before and after administration of POSFREA.
- Inspect POSFREA visually for particulate matter and discoloration before administration.

## **3 DOSAGE FORMS AND STRENGTHS**

POSFREA is sterile, clear, and colorless solution in a single-dose vial:

- Injection: 0.25 mg palonosetron in 5 mL (0.05 mg/mL)
- Injection: 0.075 mg palonosetron in 1.5 mL (0.05 mg/mL)

## **4 CONTRAINDICATIONS**

POSFREA is contraindicated in patients known to have hypersensitivity to the drug or any of its components [see *Adverse Reactions (6.2)*].

## **5 WARNINGS AND PRECAUTIONS**

### **5.1 Hypersensitivity**

Hypersensitivity reactions, including anaphylaxis, have been reported with or without known hypersensitivity to other 5-HT<sub>3</sub> receptor antagonists.

## 5.2 Serotonin Syndrome

The development of serotonin syndrome has been reported with 5-HT<sub>3</sub> receptor antagonists. Most reports have been associated with concomitant use of serotonergic drugs (e.g., selective serotonin reuptake inhibitors (SSRIs), serotonin and norepinephrine reuptake inhibitors (SNRIs), monoamine oxidase inhibitors, mirtazapine, fentanyl, lithium, tramadol, and intravenous methylene blue). Some of the reported cases were fatal. Serotonin syndrome occurring with overdose of another 5-HT<sub>3</sub> receptor antagonist alone has also been reported. The majority of reports of serotonin syndrome related to 5-HT<sub>3</sub> receptor antagonist use occurred in a post-anesthesia care unit or an infusion center.

Symptoms associated with serotonin syndrome may include the following combination of signs and symptoms: mental status changes (e.g. agitation, hallucinations, delirium, and coma), autonomic instability (e.g., tachycardia, labile blood pressure, dizziness, diaphoresis, flushing, hyperthermia), neuromuscular symptoms (e.g., tremor, rigidity, myoclonus, hyperreflexia, incoordination), seizures, with or without gastrointestinal symptoms (e.g., nausea, vomiting, diarrhea). Patients should be monitored for the emergence of serotonin syndrome, especially with concomitant use of POSFREA and other serotonergic drugs. If symptoms of serotonin syndrome occur, discontinue POSFREA and initiate supportive treatment. Patients should be informed of the increased risk of serotonin syndrome, especially if POSFREA is used concomitantly with other serotonergic drugs [see *Drug Interactions (7.1)*].

## 6 ADVERSE REACTIONS

### 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.

The safety of POSFREA has been established from adequate and well-controlled studies of another intravenous formulation of palonosetron HCl [see *Clinical Studies (14)*]. Below is a display of the adverse reactions of palonosetron HCl in these adequate and well-controlled studies.

#### Chemotherapy-Induced Nausea and Vomiting

In clinical trials for the prevention of nausea and vomiting induced by moderately or highly emetogenic chemotherapy, 1374 adult patients received a single 0.25 mg dose of palonosetron HCl. Adverse reactions were similar in frequency and severity with intravenous palonosetron HCl and ondansetron or dolasetron. The following is a listing of all adverse reactions reported by ≥ 2% of patients in these trials (Table 1).

**Table 1: Adverse Reactions from Chemotherapy-Induced Nausea and Vomiting Studies ≥ 2% in any Treatment Group**

Adverse	Palonosetron	Ondansetron 32	Dolasetron 100
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<b>Reaction</b>	<b>HCl 0.25 mg Intravenous (N=633)</b>	<b>mg Intravenous (N=410)</b>	<b>mg Intravenous (N=194)</b>
Headache	60 (9%)	34 (8%)	32 (16%)
Constipation	29 (5%)	8 (2%)	12 (6%)
Diarrhea	8 (1%)	7 (2%)	4 (2%)
Dizziness	8 (1%)	9 (2%)	4 (2%)
Fatigue	3 (< 1%)	4 (1%)	4 (2%)
Abdominal Pain	1 (< 1%)	2 (< 1%)	3 (2%)
Insomnia	1 (< 1%)	3 (1%)	3 (2%)

In other studies, 2 subjects experienced severe constipation following a single palonosetron HCl dose of approximately 0.75 mg, three times the recommended dose.

In clinical trials, the following infrequently reported adverse reactions, assessed by investigators as treatment-related or causality unknown, occurred following administration of palonosetron HCl to adult patients receiving concomitant cancer chemotherapy:

**Cardiovascular:** 1%: non-sustained tachycardia, bradycardia, hypotension, < 1%: hypertension, myocardial ischemia, extrasystoles, sinus tachycardia, sinus arrhythmia, supraventricular extrasystoles and QT prolongation. In many cases, the relationship to palonosetron was unclear.

**Dermatological:** < 1%: allergic dermatitis, rash.

**Hearing and Vision:** < 1%: motion sickness, tinnitus, eye irritation and amblyopia.

**Gastrointestinal System:** 1%: diarrhea, < 1%: dyspepsia, abdominal pain, dry mouth, hiccups and flatulence.

**General:** 1%: weakness, < 1%: fatigue, fever, hot flash, flu-like syndrome.

**Liver:** < 1%: transient, asymptomatic increases in AST and/or ALT and bilirubin. These changes occurred predominantly in patients receiving highly emetogenic chemotherapy.

**Metabolic:** 1%: hyperkalemia, < 1%: electrolyte fluctuations, hyperglycemia, metabolic acidosis, glycosuria, appetite decrease, anorexia.

**Musculoskeletal:** < 1%: arthralgia.

**Nervous System:** 1%: dizziness, < 1%: somnolence, insomnia, hypersomnia, paresthesia.

**Psychiatric:** 1%: anxiety, < 1%: euphoric mood.

**Urinary System:** < 1%: urinary retention.

**Vascular:** < 1%: vein discoloration, vein distention.

#### Postoperative Nausea and Vomiting

The adverse reactions cited in Table 2 were reported in  $\geq 2\%$  of adults receiving intravenous palonosetron HCl 0.075 mg immediately before induction of anesthesia in three randomized placebo-controlled trials. Rates of adverse reactions between

palonosetron HCl and placebo groups were similar. Some events are known to be associated with, or may be exacerbated by concomitant perioperative and intraoperative medications administered in this surgical population See *Clinical Pharmacology (12.2)* for thorough QT/QTc study results and data demonstrating the lack of palonosetron effect on QT/QTc.

**Table 2: Adverse Reactions from Postoperative Nausea and Vomiting Studies  $\geq$  2% in any Treatment Group**

<b>Adverse Reaction</b>	<b>Palonosetron HCl 0.075 mg Intravenous (N=336)</b>	<b>Placebo (N=369)</b>
Electrocardiogram QT prolongation	16 (5%)	11 (3%)
Bradycardia	13 (4%)	16 (4%)
Headache	11 (3%)	14 (4%)
Constipation	8 (2%)	11(3%)

In these clinical trials, the following infrequently reported adverse reactions, assessed by investigators as treatment-related or causality unknown, occurred following administration of palonosetron HCl to adult patients receiving concomitant perioperative and intraoperative medications including those associated with anesthesia:

*Cardiovascular:* 1% electrocardiogram QTc prolongation, sinus bradycardia, tachycardia; <1%: blood pressure decreased, hypotension, hypertension, arrhythmia, ventricular extrasystoles, generalized edema; ECG T wave amplitude decreased, platelet count decreased. The frequency of these adverse effects did not appear to be different from placebo.

*Dermatological:* 1%: pruritus.

*Gastrointestinal System:* 1%: flatulence, < 1%: dry mouth, upper abdominal pain, salivary hypersecretion, dyspepsia, diarrhea, intestinal hypomotility, anorexia.

*General:* < 1%: chills.

*Liver:* 1%: increases in AST and/or ALT < 1%: hepatic enzyme increased

*Metabolic:* < 1%: hypokalemia, anorexia.

*Nervous System:* < 1%: dizziness.

*Respiratory:* < 1%: hypoventilation, laryngospasm.

*Urinary System:* 1%: urinary retention.

## **6.2 Postmarketing Experience**

The following adverse reactions have been identified during post approval use of another intravenous formulation of palonosetron HCl. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

Very rare cases (<1/10,000) of hypersensitivity reactions including anaphylaxis and anaphylactic shock and injection site reactions (burning, induration, discomfort and pain) were reported from postmarketing experience of palonosetron HCl 0.25 mg in the prevention of chemotherapy- induced nausea and vomiting.

## **7 DRUG INTERACTIONS**

### **7.1 Serotonergic Drugs**

Serotonin syndrome (including altered mental status, autonomic instability, and neuromuscular symptoms) has been described following the concomitant use of 5-HT<sub>3</sub> receptor antagonists and other serotonergic drugs, including selective serotonin reuptake inhibitors (SSRIs) and serotonin and noradrenaline reuptake inhibitors (SNRIs). Monitor for the emergence of serotonin syndrome. If symptoms occur, discontinue POSFREA and initiate supportive treatment [see *Warnings and Precautions (5.2)*].

## **8 USE IN SPECIFIC POPULATIONS**

### **8.1 Pregnancy**

#### Risk Summary

There are no available data on palonosetron HCl use in pregnant women to inform a drug- associated risk. In animal reproduction studies, no effects on embryo-fetal development were observed with the administration of oral palonosetron HCl to rats and rabbits during organogenesis at doses up to 1894 and 3789 times the recommended human intravenous dose, respectively [see *Data*].

The estimated background risk of major birth defects and miscarriage for the indicated population is unknown. 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*

In animal reproduction studies, no effects on embryo-fetal development were observed in pregnant rats given oral palonosetron HCl at doses up to 60 mg/kg/day (1894 times the recommended human intravenous dose based on body surface area) or pregnant rabbits given oral doses up to 60 mg/kg/day (3789 times the recommended human intravenous dose based on body surface area) during the period of organogenesis.

### **8.2 Lactation**

#### Risk Summary

There are no data on the presence of palonosetron in human milk, the effects of palonosetron on the breastfed infant, or the effects of palonosetron on milk production. The developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for POSFREA and any potential adverse effects on the breastfed infant from palonosetron or from the underlying maternal condition.

## 8.4 Pediatric Use

This product has not been approved for use in pediatric patients for prevention of chemotherapy- induced nausea and vomiting.

The safety and effectiveness of POSFREA for prevention of postoperative nausea and vomiting have not been established in pediatric patients.

## 8.5 Geriatric Use

Of the 1374 adult cancer patients in clinical studies of intravenously administered palonosetron HCl for CINV, 316 (23%) were aged 65 years and over, while 71 (5%) were aged 75 years and over. Of the 1520 adult patients in clinical studies of intravenously administered palonosetron HCl for PONV, 73 (5%) were age 65 years older [see *Clinical Studies (14)*]. No overall differences in safety or effectiveness were observed between these subjects and the younger subjects, but greater sensitivity in some older individuals cannot be ruled out. Population pharmacokinetics analysis did not reveal any differences in palonosetron pharmacokinetics between cancer patients  $\geq$  65 years of age and younger patients. No dose adjustment or special monitoring are required for geriatric patients.

No overall differences in safety were observed between older and younger subjects in these studies, though the possibility of heightened sensitivity in some older individuals cannot be excluded. No differences in efficacy were observed in geriatric patients for the CINV indication and none are expected for geriatric PONV patients. However, palonosetron HCl efficacy in geriatric patients has not been adequately evaluated.

## 10 OVERDOSAGE

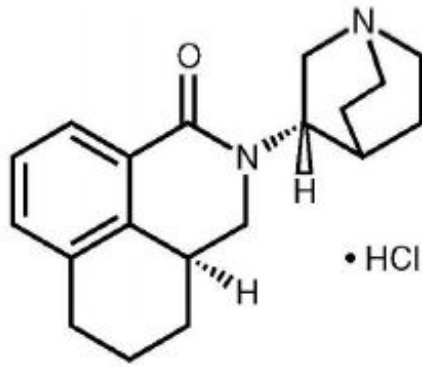
There is no known antidote to palonosetron HCl. Overdose should be managed with supportive care.

Dialysis studies have not been performed, however, due to the large volume of distribution, dialysis is unlikely to be an effective treatment for palonosetron HCl overdose. A single intravenous dose of palonosetron HCl at 30 mg/kg (947 and 474 times the human dose for rats and mice, respectively, based on body surface area) was lethal to rats and mice. The major signs of toxicity were convulsions, gasping, pallor, cyanosis and collapse.

## 11 DESCRIPTION

POSFREA Injection contains palonosetron as palonosetron HCl, an antiemetic and antinauseant agent. It is a serotonin-3 (5-HT<sub>3</sub>) receptor antagonist with a strong binding affinity for this receptor. Chemically, palonosetron HCl is: (3aS)-2-[(S)-1-Azabicyclo [2.2.2]oct 3-yl]-2,3,3a,4,5,6-hexahydro-1-oxo-1Hbenz[de]isoquinoline hydrochloride. The empirical formula is C<sub>19</sub>H<sub>24</sub>N<sub>2</sub>O.HCl, with a molecular weight of 332.87. Palonosetron HCl exists as a single isomer and has the following structural formula:





Palonosetron HCl is a white to off-white crystalline powder. It is freely soluble in water and soluble in propylene glycol and slightly soluble in ethanol and 2-propanol.

POSFREA Injection is a sterile, clear, colorless, non-pyrogenic, isotonic, buffered solution for intravenous administration. POSFREA Injection is available as 5 mL single- dose vial or 1.5 mL single dose vial.

Each mL of aqueous solution contains 0.05 mg palonosetron (equivalent to 0.056 mg palonosetron hydrochloride). Each mL also contains 41.5 mg mannitol, 3.0 mg sodium acetate trihydrate, and water for injection (q.s. to 1.0 mL).

The pH of the solution in the 5 mL and 1.5 mL vials is 4.5 to 5.5. Hydrochloric acid or sodium hydroxide may have been added to adjust pH.

## 12 CLINICAL PHARMACOLOGY

### 12.1 Mechanism of Action

Palonosetron is a 5-HT<sub>3</sub> receptor antagonist with a strong binding affinity for this receptor and little or no affinity for other receptors.

Cancer chemotherapy may be associated with a high incidence of nausea and vomiting, particularly when certain agents, such as cisplatin, are used. 5-HT<sub>3</sub> receptors are located on the nerve terminals of the vagus in the periphery and centrally in the chemoreceptor trigger zone of the area postrema. It is thought that chemotherapeutic agents produce nausea and vomiting by releasing serotonin from the enterochromaffin cells of the small intestine and that the released serotonin then activates 5-HT<sub>3</sub> receptors located on vagal afferents to initiate the vomiting reflex.

Postoperative nausea and vomiting is influenced by multiple patient, surgical and anesthesia related factors and is triggered by release of 5-HT in a cascade of neuronal events involving both the central nervous system and the gastrointestinal tract. The 5-HT<sub>3</sub> receptor has been demonstrated to selectively participate in the emetic response.

### 12.2 Pharmacodynamics

#### Cardiac Electrophysiology

The effect of intravenous palonosetron on blood pressure, heart rate, and ECG parameters including QTc were comparable to intravenous ondansetron and dolasetron in CINV clinical trials. In PONV clinical trials the effect of palonosetron on the QTc interval

was no different from placebo. In non-clinical studies palonosetron possesses the ability to block ion channels involved in ventricular de- and re-polarization and to prolong action potential duration.

The effect of palonosetron on QTc interval was evaluated in a double blind, randomized, parallel, placebo and positive (moxifloxacin) controlled trial in adult men and women. The objective was to evaluate the ECG effects of intravenously administered palonosetron HCl at single doses of 0.25, 0.75 or 2.25 mg in 221 healthy subjects. At a dose 9 times the maximum recommended dose, palonosetron did not prolong the QT interval to any clinically relevant extent.

### **12.3 Pharmacokinetics**

After intravenous dosing of palonosetron HCl in healthy subjects and cancer patients, an initial decline in plasma concentrations is followed by a slow elimination from the body. Mean maximum plasma concentration ( $C_{max}$ ) and area under the concentration-time curve ( $AUC_{0-\infty}$ ) are generally dose proportional over the dose range of 0.3 to 90 mcg/kg in healthy subjects and in cancer patients. Following a single intravenous dose of palonosetron HCl at 3 mcg/kg (or 0.21 mg/70 kg) to six cancer patients, the mean ( $\pm$ SD) maximum plasma concentration was estimated to be  $5630 \pm 5480$  ng/L and the mean AUC was  $35.8 \pm 20.9$  h•mcg/L.

Following intravenous administration of palonosetron HCl 0.25 mg once every other day for 3 doses in 11 cancer patients, the mean increase in plasma palonosetron concentration from Day 1 to Day 5 was  $42 \pm 34\%$ . Following intravenous administration of palonosetron HCl 0.25 mg once daily for 3 days in 12 healthy subjects, the mean ( $\pm$ SD) increase in plasma palonosetron concentration from Day 1 to Day 3 was  $110 \pm 45\%$ .

After intravenous dosing of palonosetron HCl in patients undergoing surgery (abdominal surgery or vaginal hysterectomy), the pharmacokinetic characteristics of palonosetron were similar to those observed in cancer patients.

#### Distribution

Palonosetron has a volume of distribution of approximately  $8.3 \pm 2.5$  L/kg. Approximately 62% of palonosetron is bound to plasma proteins.

#### Elimination

After a single intravenous dose of 10 mcg/kg [ $^{14}$ C]-palonosetron HCl, approximately 80% of the dose was recovered within 144 hours in the urine with palonosetron representing approximately 40% of the administered dose. In healthy subjects, the total body clearance of palonosetron was  $0.160 \pm 0.035$  L/h/kg and renal clearance was  $0.067 \pm 0.018$  L/h/kg. Mean terminal elimination half-life is approximately 40 hours.

#### *Metabolism*

Palonosetron is eliminated by multiple routes with approximately 50% metabolized to form two primary metabolites: N-oxide-palonosetron and 6-S-hydroxy-palonosetron. These metabolites each have less than 1% of the 5-HT<sub>3</sub> receptor antagonist activity of palonosetron. *In vitro* metabolism studies have suggested that CYP2D6 and to a lesser extent, CYP3A4 and CYP1A2 are involved in the metabolism of palonosetron. However, clinical pharmacokinetic parameters are not significantly different between poor and extensive metabolizers of CYP2D6 substrates.

## *Excretion*

Palonosetron is partially eliminated from the body through renal excretion.

## Specific Populations

### *Renal Impairment*

Mild to moderate renal impairment does not significantly affect palonosetron pharmacokinetic parameters. Total systemic exposure increased by approximately 28% in severe renal impairment relative to healthy subjects. This increase is not considered clinically meaningful.

### *Hepatic Impairment*

Hepatic impairment does not significantly affect total body clearance of palonosetron compared to the healthy subjects.

### *Race/Ethnicity*

The pharmacokinetics of palonosetron were characterized in twenty-four healthy Japanese subjects over an intravenous dose range of 3 to 90 mcg/kg. Total body clearance was 25% higher in Japanese subjects compared to Whites, however, this increase is not considered clinically meaningful. The pharmacokinetics of palonosetron in Blacks have not been adequately characterized.

## Drug Interaction Studies

*In vitro* studies indicated that palonosetron is not an inhibitor of CYP1A2, CYP2A6, CYP2B6, CYP2C9, CYP2D6, CYP2E1 and CYP3A4/5 (CYP2C19 was not investigated) nor does it induce the activity of CYP1A2, CYP2D6, or CYP3A4/5. Therefore, the potential for clinically significant drug interactions with palonosetron appears to be low.

### *Dexamethasone*

Coadministration of 0.25 mg palonosetron HCl and 20 mg dexamethasone administered intravenously in healthy subjects revealed no pharmacokinetic drug-interactions between palonosetron and dexamethasone.

### *Oral Aprepitant*

In an interaction study in healthy subjects where a single 0.25 mg intravenous dose of palonosetron HCl was administered on day 1 and oral aprepitant for 3 days (125 mg/80 mg/80 mg), the pharmacokinetics of palonosetron were not significantly altered (AUC: no change,  $C_{max}$ : 15% increase).

### *Metoclopramide*

A study in healthy subjects involving a single 0.75 mg intravenous dose of palonosetron HCl and steady state oral metoclopramide (10 mg four times daily) demonstrated no significant pharmacokinetic interaction.

### *Corticosteroids, Analgesics, Antiemetics/Antinauseants, Antispasmodics and Anticholinergic Agents*

In controlled clinical trials, palonosetron HCl has been safely administered with corticosteroids, analgesics, antiemetics/antinauseants, antispasmodics and anticholinergic agents.

## **13 NONCLINICAL TOXICOLOGY**

### **13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility**

In a 104-week carcinogenicity study in CD-1 mice, animals were treated with oral doses of palonosetron HCl at 10, 30 and 60 mg/kg/day. Treatment with palonosetron was not tumorigenic. The highest tested dose produced a systemic exposure to palonosetron (plasma AUC) of about 150 to 289 times the human exposure (AUC= 29.8 h•mcg/L) at the recommended intravenous dose of 0.25 mg. In a 104-week carcinogenicity study in Sprague-Dawley rats, male and female rats were treated with oral doses of 15, 30 and 60 mg/kg/day and 15, 45 and 90 mg/kg/day, respectively. The highest doses produced a systemic exposure to palonosetron (plasma AUC) of 137 and 308 times the human exposure at the recommended dose. Treatment with palonosetron HCl produced increased incidences of adrenal benign pheochromocytoma and combined benign and malignant pheochromocytoma, increased incidences of pancreatic Islet cell adenoma and combined adenoma and carcinoma and pituitary adenoma in male rats. In female rats, it produced hepatocellular adenoma and carcinoma and increased the incidences of thyroid C-cell adenoma and combined adenoma and carcinoma.

Palonosetron was not genotoxic in the Ames test, the Chinese hamster ovarian cell (CHO/HGPRT) forward mutation test, the *ex vivo* hepatocyte unscheduled DNA synthesis (UDS) test or the mouse micronucleus test. It was, however, positive for clastogenic effects in the Chinese hamster ovarian (CHO) cell chromosomal aberration test.

Palonosetron HCl at oral doses up to 60 mg/kg/day (about 1894 times the recommended human intravenous dose based on body surface area) was found to have no effect on fertility and reproductive performance of male and female rats.

## **14 CLINICAL STUDIES**

The safety and efficacy of POSFREA have been established based on adequate and well-controlled adult studies of another intravenous formulation of palonosetron HCl in chemotherapy induced nausea and vomiting and postoperative nausea and vomiting. Below is a display of the results of these adequate and well-controlled studies of palonosetron HCl in these conditions.

### **14.1 Chemotherapy Induced Nausea and Vomiting in Adults**

Efficacy of a single intravenous dose of palonosetron HCl in preventing acute and delayed nausea and vomiting induced by both moderately and highly emetogenic chemotherapy was studied in 4 trials. In these double-blind studies, complete response rates (no emetic episodes and no rescue medication) and other efficacy parameters were assessed through at least 120 hours after administration of chemotherapy. The safety and efficacy of palonosetron HCl in repeated courses of chemotherapy was also assessed.

#### Moderately Emetogenic Chemotherapy

Two double-blind trials (Study 1 and Study 2) involving 1132 patients compared a single intravenous dose of palonosetron HCl with either a single intravenous dose of

ondansetron (Study 1) or dolasetron (Study 2) given 30 minutes prior to moderately emetogenic chemotherapy including carboplatin, cisplatin  $\leq 50 \text{ mg/m}^2$ , cyclophosphamide  $<1500 \text{ mg/m}^2$ , doxorubicin  $> 25 \text{ mg/m}^2$ , epirubicin, irinotecan, and methotrexate  $>250 \text{ mg/m}^2$ . Concomitant corticosteroids were not administered prophylactically in Study 1 and were only used by 4 to 6% of patients in Study 2. The majority of patients in these studies were women (77%), White (65%) and naïve to previous chemotherapy (54%). The mean age was 55 years.

### Highly Emetogenic Chemotherapy

A double-blind, dose-ranging trial evaluated the efficacy of a single intravenous dose of palonosetron HCl from 0.3 to 90 mcg/kg (equivalent to  $< 0.1 \text{ mg}$  to  $6 \text{ mg}$  fixed dose) in 161 chemotherapy-naïve adult cancer patients receiving highly-emetogenic chemotherapy (either cisplatin  $\geq 70 \text{ mg/m}^2$  or cyclophosphamide  $> 1100 \text{ mg/m}^2$ ). Concomitant corticosteroids were not administered prophylactically. Analysis of data from this trial indicates that 0.25 mg is the lowest effective dose in preventing acute nausea and vomiting induced by highly emetogenic chemotherapy.

A double-blind trial involving 667 patients compared a single intravenous dose of palonosetron HCl with a single intravenous dose of ondansetron (Study 3) given 30 minutes prior to highly emetogenic chemotherapy including cisplatin  $\geq 60 \text{ mg/m}^2$ , cyclophosphamide  $> 1500 \text{ mg/m}^2$ , and dacarbazine. Corticosteroids were co-administered prophylactically before chemotherapy in 67% of patients. Of the 667 patients, 51% were women, 60% White, and 59% naïve to previous chemotherapy. The mean age was 52 years.

### *Efficacy Results*

The antiemetic activity of palonosetron HCl was evaluated during the acute phase (0-24 hours) [Table 4], delayed phase (24-120 hours) [Table 5], and overall phase (0-120 hours) [Table 6] post-chemotherapy in Studies 1, 2 and 3.

**Table 4: Prevention of Acute Nausea and Vomiting (0-24 hours): Complete Response Rates**

<b>Chemotherapy</b>	<b>Study</b>	<b>Treatment Group</b>	<b>N<sup>a</sup></b>	<b>% with Complete Response</b>	<b>p-value<sup>b</sup></b>	<b>97.5% Confidence Interval</b>
Moderately Emetogenic	1	Palonosetron HCl 0.25 mg Intravenous	189	81	0.009	<b>Palonosetron HCl minus Comparator c</b>
		Ondansetron 32 mg Intravenous <sup>d</sup>	185	69		
	2	Palonosetron HCl 0.25 mg Intravenous	189	63	NS	
		Dolasetron 100 mg Intravenous	191	53		

Highly Emetogenic	3	Palonosetron HCl 0.25 mg Intravenous	223	59	NS
		Ondansetron 32 mg Intravenous <sup>d</sup>	221	57	

a Intent-to-treat cohort

b 2-sided Fisher's exact test. Significance level at  $\alpha=0.025$ .

c These studies were designed to show non-inferiority. A lower bound greater than -15% demonstrates non-inferiority between palonosetron HCl and comparator.

d Ondansetron 32 mg intravenous was used in the clinical trial. Although this dose was used in the trial, this is no longer the currently recommended dose. Refer to the ondansetron prescribing information for the current recommended dose.

These trials show that palonosetron HCl was effective in the prevention of acute nausea and vomiting associated with initial and repeat courses of moderately and highly emetogenic cancer chemotherapy. In Study 3, efficacy was greater when prophylactic corticosteroids were administered concomitantly. Clinical superiority over other 5-HT<sub>3</sub> receptor antagonists has not been adequately demonstrated in the acute phase.

**Table 5: Prevention of Delayed Nausea and Vomiting (24-120 hours): Complete Response Rates**

Chemotherapy	Study	Treatment Group	N <sup>a</sup>	% with Complete Response <sup>b</sup>	p-value <sup>b</sup>	97.5% Confidence Interval Palonosetron HCl minus Comparator <sup>c</sup>
Moderately Emetogenic	1	Palonosetron HCl 0.25 mg Intravenous	189	74	<0.001	
		Ondansetron 32 mg Intravenous <sup>d</sup>	185	55		
	2	Palonosetron HCl 0.25 mg Intravenous	189	54	0.004	
		Dolasetron 100 mg Intravenous	191	39		

a Intent-to-treat cohort

b 2-sided Fisher's exact test. Significance level at  $\alpha=0.025$ .

c These studies were designed to show non-inferiority. A lower bound greater than -15% demonstrates noninferiority between palonosetron HCl and comparator.

d Ondansetron 32 mg intravenous was used in the clinical trial. Although this dose was

used in the trial, this is no longer the currently recommended dose. Refer to the ondansetron prescribing information for the current recommended dose.

These trials show that palonosetron HCl was effective in the prevention of delayed nausea and vomiting associated with initial and repeat courses of moderately emetogenic chemotherapy.

**Table 6: Prevention of Overall Nausea and Vomiting (0-120 hours): Complete Response Rates**

<b>Chemotherapy</b>	<b>Study</b>	<b>Treatment Group</b>	<b>N<sup>a</sup></b>	<b>% with Complete Response</b>	<b>p-value<sup>b</sup></b>	<b>97.5% Confidence Interval Palonosetron HCl minus Comparator<sup>c</sup></b>
Moderately Emetogenic	1	Palonosetron HCl 0.25 mg Intravenous	189	69	<0.001	
		Ondansetron 32 mg Intravenous <sup>d</sup>	185	50		
	2	Palonosetron HCl 0.25 mg Intravenous	189	46	0.021	
		Dolasetron 100 mg Intravenous	191	34		

a Intent-to-treat cohort

b 2-sided Fisher's exact test. Significance level at  $\alpha=0.025$ .

c These studies were designed to show non-inferiority. A lower bound greater than -15% demonstrates non-inferiority between palonosetron HCl and comparator.

d Ondansetron 32 mg intravenous was used in the clinical trial. Although this dose was used in the trial, this is no longer the currently recommended dose. Refer to the ondansetron prescribing information for the current recommended dose.

These trials show that palonosetron HCl was effective in the prevention of nausea and vomiting throughout the 120 hours (5 days) following initial and repeat courses of moderately emetogenic cancer chemotherapy.

## 14.2 Postoperative Nausea and Vomiting

In one multicenter, randomized, stratified, double-blind, parallel-group, clinical trial (Study 1), palonosetron HCl was compared with placebo for the prevention of PONV in 546 patients undergoing abdominal and gynecological surgery. All patients received general anesthesia. Study 1 was a pivotal study conducted predominantly in the US in the out-patient setting for patients undergoing elective gynecologic or abdominal laparoscopic surgery and stratified at randomization for the following risk factors: gender, non-smoking status, history of postoperative nausea and vomiting and/or motion sickness.

In Study 1 patients were randomized to receive palonosetron HCl 0.025 mg, 0.050 mg or 0.075 mg or placebo, each given intravenously immediately prior to induction of anesthesia. The antiemetic activity of palonosetron was evaluated during the 0 to 72 hour time period after surgery.

Of the 138 patients treated with 0.075 mg palonosetron HCl in Study 1 and evaluated for efficacy, 96% were women; 66% had a history of PONV or motion sickness; 85% were non smokers. As for race, 63% were White, 20% were Black, 15% were Hispanic, and 1% were Asian. The age of patients ranged from 21 to 74 years, with a mean age of 37.9 years. Three patients were greater than 65 years of age.

Co-primary efficacy measures were Complete Response (CR) defined as no emetic episode and no use of rescue medication in the 0-24 and in the 24-72 hours postoperatively.

Secondary efficacy endpoints included:

- Complete Response (CR) 0-48 and 0-72 hours
- Complete Control (CC) defined as CR and no more than mild nausea
- Severity of nausea (none, mild, moderate, severe)

The primary hypothesis in Study 1 was that at least one of the three palonosetron HCl doses were superior to placebo.

Results for Complete Response in Study 1 for 0.075 mg palonosetron HCl versus placebo are described in the following table.

**Table 7: Prevention of Postoperative Nausea and Vomiting: Complete Response (CR), Study 1, Palonosetron HCl 0.075 mg Vs Placebo**

Treatment	n/N (%)	Palonosetron HCl Vs Placebo	
		$\Delta$	p-value*
<b>Co-primary Endpoints</b>			
<b>CR 0-24 hours</b>			
<b>Palonosetron HCl</b>	59/138 (42.8%)	16.8%	0.004
<b>Placebo</b>	35/135 (25.9%)		
<b>CR 24-72 hours</b>			
<b>Palonosetron HCl</b>	67/138 (48.6%)	7.8%	0.188
<b>Placebo</b>	55/135 (40.7%)		

\* To reach statistical significance for each co-primary endpoint, the required significance limit for the lowest p- value was  $p < 0.017$ .

$\Delta$  Difference (%): palonosetron HCl 0.075 mg minus placebo

Palonosetron HCl 0.075 mg reduced the severity of nausea compared to placebo. Analyses of other secondary endpoints indicate that palonosetron HCl 0.075 mg was numerically better than placebo; however, statistical significance was not formally demonstrated.

A randomized, double-blind, multicenter, placebo-controlled, dose ranging trial was performed to evaluate intravenous palonosetron HCl for the prevention of post-



operative nausea and vomiting following abdominal or vaginal hysterectomy. Five intravenous palonosetron HCl doses (0.1, 0.3, 1.0, 3.0 and 30 µg/kg) were evaluated in a total of 381 intent-to-treat patients. The primary efficacy measure was the proportion of patients with CR in the first 24 hours after recovery from surgery. The lowest effective dose was palonosetron HCl 1 mcg/kg (approximately 0.075 mg) which had a CR rate of 44% versus 19% for placebo, p=0.004. Palonosetron HCl 1 mcg/kg also significantly reduced the severity of nausea versus placebo, p=0.009.

## 16 HOW SUPPLIED/STORAGE AND HANDLING

### How Supplied

POSFREA™ injection is clear and colorless solution and is supplied in single-dose vials as follows:

<u>NDC Number</u>	<u>Strength</u>	<u>Package</u>
83831-105-01	0.25 mg palonosetron in 5 mL (0.05 mg/mL)	1 vial/carton
83831-104-05	0.075 mg palonosetron in 1.5 mL (0.05 mg/mL)	5 vials/carton

### Storage

- Store at 20°C to 25°C (68°F to 77°F); [Excursions permitted to 15°C to 30°C (59°F to 86°F)].
- Protect from freezing.
- Protect from light.

## 17 PATIENT COUNSELING INFORMATION

Advise patients to read the FDA-approved patient labeling (Patient Information).

### Hypersensitivity Reactions

Advise patients that hypersensitivity reactions, including anaphylaxis, have been reported in patients with or without known hypersensitivity to other 5-HT<sub>3</sub> receptor antagonists. Advise patients to seek immediate medical attention if any signs or symptoms of a hypersensitivity reaction occur with administration of POSFREA [see *Warnings and Precautions (5.1)*].

### Serotonin Syndrome

Advise patients of the possibility of serotonin syndrome, especially with concomitant use of POSFREA and another serotonergic agent such as medications to treat depression and migraines. Advise patients to seek immediate medical attention if the following symptoms occur: changes in mental status, autonomic instability, neuromuscular symptoms with or without gastrointestinal symptoms [see *Warnings and Precautions (5.2)*].

### **Manufactured for:**

Avyxa Pharma, LLC

New Jersey 07054, USA

Revised: 07/2024



## SPL PATIENT PACKAGE INSERT

### PATIENT INFORMATION

#### **POSFREA™ (pos-FREE-uh) (palonosetron) injection, for intravenous use**

Read this Patient Information before you receive POSFREA and each time you receive POSFREA. There may be new information. This information does not take the place of talking with your doctor about your medical condition or your treatment.

#### **What is POSFREA?**

POSFREA is a prescription medicine called an "antiemetic."

POSFREA is used in adults to help prevent the nausea and vomiting that happens:

- right away or later with certain anti-cancer medicines (chemotherapy)
- up to 24 hours while recovering from anesthesia after surgery

This product has not been approved for use in children to help prevent nausea and vomiting after chemotherapy.

It is not known if POSFREA is safe and effective in children for the prevention of nausea and vomiting while recovering from anesthesia after surgery.

#### **Who should not receive POSFREA?**

Do not receive POSFREA if you are allergic to palonosetron hydrochloride or any of the ingredients in POSFREA. See the end of this leaflet for a complete list of ingredients in POSFREA.

#### **What should I tell my doctor before receiving POSFREA?**

**Before receiving POSFREA, tell your doctor about all of your medical conditions, including if you:**

- have had an allergic reaction to another medicine for nausea or vomiting
- are pregnant or plan to become pregnant. It is not known if POSFREA will harm your unborn baby.
- are breastfeeding or plan to breastfeed. It is not known if POSFREA passes into your breast milk or if it will affect your baby or your breast milk. Talk to your doctor about the best way to feed your baby if you will receive POSFREA.

**Tell your doctor about all of the medicines you take** including prescription and over-the-counter medicines, vitamins and herbal supplements.

POSFREA and certain other medicines can affect each other, causing serious side effects.

#### **How will I receive POSFREA?**

- POSFREA will be given to you in your vein by intravenous (I.V.) injection.
- POSFREA is usually given about 30 minutes before you receive your anti-cancer medicine (chemotherapy) or right before anesthesia for surgery.

**What are the possible side effects of POSFREA? POSFREA may cause**

### **serious side effects, including:**

● **Serious allergic reactions.** POSFREA can cause allergic reactions that can sometimes be serious. Tell your doctor or nurse right away if you have any of the following symptoms of a serious allergic reaction with POSFREA:

- hives
- swollen face
- breathing trouble
- chest pain

● **Serotonin Syndrome.** A possible life-threatening problem called serotonin syndrome can happen with medicines called 5-HT<sub>3</sub> receptor antagonists, including POSFREA, especially when used with medicines used to treat depression and migraine headaches called serotonin reuptake inhibitors (SSRIs), serotonin and norepinephrine reuptake inhibitors (SNRIs), monoamine oxidase inhibitors (MAOIs) and certain other medicines. Tell your doctor or nurse right away if you have any of the following symptoms of serotonin syndrome:

- agitation, seeing things that are not there (hallucinations), confusion, or coma
- fast heartbeat or unusual and frequent changes in your blood pressure
- dizziness, sweating, flushing, or fever
- tremors, stiff muscles, muscle twitching, overactive reflexes, or loss of coordination
- seizures
- nausea, vomiting, or diarrhea

● The most common side effects of POSFREA in adults who receive POSFREA to help prevent nausea and vomiting that happens with certain anti-cancer medicine (chemotherapy) include: headache and constipation.

● The most common side effects of POSFREA in adults who receive POSFREA to help prevent nausea and vomiting that happens while recovering from anesthesia after surgery include: serious or life-threatening heart rhythm changes (QT prolongation), slow heartbeat, headache, and constipation. These are not all the possible side effects of POSFREA. Call your doctor for medical advice about side effects. You may report side effects to FDA at 1-800-FDA-1088.

### **General information about the safe and effective use of POSFREA**

Medicines are sometimes prescribed for purposes other than those listed in a Patient Information leaflet. You can ask your doctor or pharmacist for information about POSFREA that is written for health professionals.

### **What are the ingredients in POSFREA?**

**Active ingredient:** palonosetron hydrochloride

**Inactive ingredients:** mannitol and sodium acetate trihydrate in water for intravenous administration.

Hydrochloric acid or sodium hydroxide may have been added to adjust pH.

Rx Only

Manufactured for:

**Avyxa Pharma, LLC**

New Jersey 07054, USA

For more information call 1-888-520-0954.

Made in India

Revised: 07/2024



This Patient Information has been approved by the U.S. Food and Drug Administration.

**PACKAGE LABEL.PRINCIPAL DISPLAY PANEL**

NDC 83831-105-01      Rx only      Store at 20°C to 25°C (68°F to 77°F);  
[Excursions permitted to  
15°C to 30°C (59°F to 86°F)].

**Posfrea™**  
**(palonosetron) Injection**


**0.25 mg/5 mL**  
**(0.05 mg/mL)**

For intravenous use  
5 mL Single Dose Vial

**Protect from light.**  
**Protect from freezing.**

Recommended Dosage:  
see Prescribing Information.

**Manufactured for:** Avyxa Pharma, LLC  
New Jersey 07054, USA  
Made in India

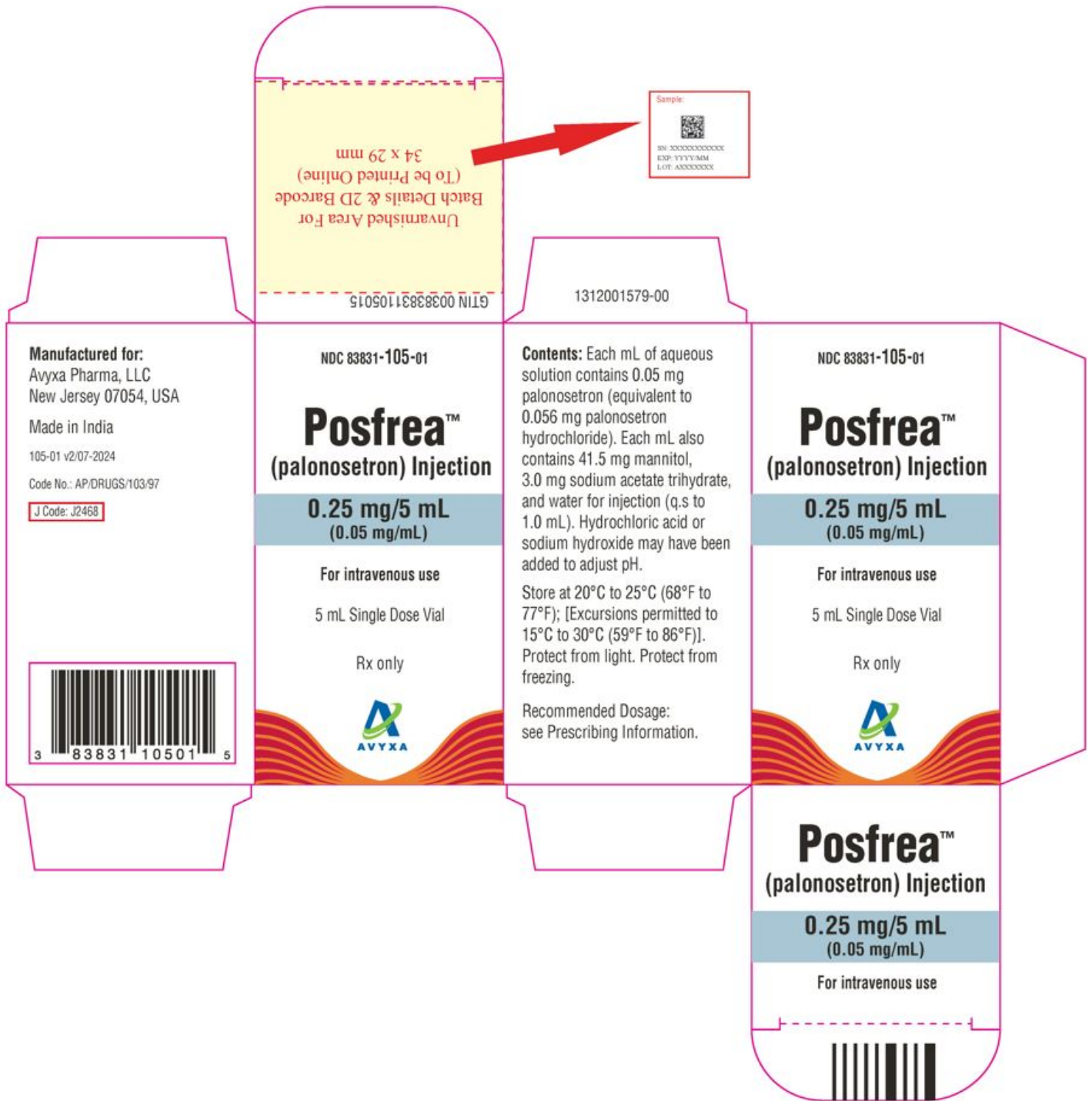


105-01 v2/07-2024  
Code No.: AP/DRUGS/103/97  
1311001703-00

Lot: |  
Exp.: |

**Un Varnish Area**  
**18 x 10 mm**

**Posfrea (palonosetron) Injection, 0.25mg/5 mL -Container label**



**Posfrea (palonosetron) Injection, 0.25mg/5 mL -Carton label**

**POSFREA**

palonosetron injection, solution

**Product Information**

<b>Product Type</b>	HUMAN PRESCRIPTION DRUG	<b>Item Code (Source)</b>	NDC:83831-105
<b>Route of Administration</b>	INTRAVENOUS		

Active Ingredient/Active Moiety				
Ingredient Name		Basis of Strength	Strength	
PALONOSETRON HYDROCHLORIDE (UNII: 23310D4I19) (PALONOSETRON - UNII:5D06587D6R)		PALONOSETRON	0.25 mg in 5 mL	
Inactive Ingredients				
Ingredient Name		Strength		
MANNITOL (UNII: 3OWL53L36A)				
SODIUM ACETATE (UNII: 4550K0SC9B)				
WATER (UNII: 059QF0KO0R)				
Packaging				
#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:83831-105-01	1 in 1 CARTON	09/30/2024	
1		5 mL in 1 VIAL, SINGLE-DOSE; Type 0: Not a Combination Product		
Marketing Information				
Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date	
NDA	NDA203050	09/30/2024		

POSFREA			
palonosetron injection, solution			
Product Information			
Product Type	HUMAN PRESCRIPTION DRUG	Item Code (Source)	NDC:83831-104
Route of Administration	INTRAVENOUS		
Active Ingredient/Active Moiety			
Ingredient Name		Basis of Strength	Strength
PALONOSETRON HYDROCHLORIDE (UNII: 23310D4I19) (PALONOSETRON - UNII:5D06587D6R)		PALONOSETRON	0.075 mg in 1.5 mL
Inactive Ingredients			
Ingredient Name		Strength	
MANNITOL (UNII: 3OWL53L36A)			
SODIUM ACETATE (UNII: 4550K0SC9B)			

**WATER** (UNII: 059QF0KO0R)

### Packaging

#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:83831-104-05	5 in 1 CARTON	09/30/2024	09/30/2024
1		1.5 mL in 1 VIAL, SINGLE-USE; Type 0: Not a Combination Product		

### Marketing Information

Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
NDA	NDA203050	09/30/2024	09/30/2024

**Labeler** - Avyxa Pharma, LLC (128918748)

**Registrant** - Avyxa Holdings, LLC. (119187191)

### Establishment

Name	Address	ID/FEI	Business Operations
Gland Pharma Hyderabad		918601238	ANALYSIS(83831-105, 83831-104) , API MANUFACTURE(83831-105, 83831-104) , LABEL(83831-105, 83831-104) , MANUFACTURE(83831-105, 83831-104) , PACK(83831-105, 83831-104)

Revised: 9/2024

Avyxa Pharma, LLC