

# **AGGRASTAT- tirofiban injection, solution**

## **Medicure International Inc**

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### **HIGHLIGHTS OF PRESCRIBING INFORMATION**

**These highlights do not include all the information needed to use AGGRASTAT® (tirofiban hydrochloride) safely and effectively. See full prescribing information for AGGRASTAT.**

**AGGRASTAT (tirofiban hydrochloride) injection, for intravenous use**  
**Initial U.S. Approval: 1998**

### **INDICATIONS AND USAGE**

AGGRASTAT is a platelet aggregation inhibitor indicated to reduce the rate of thrombotic cardiovascular events (combined endpoint of death, myocardial infarction, or refractory ischemia/repeat cardiac procedure) in patients with non-ST elevation acute coronary syndrome (NSTEMI-ACS). (1)

### **DOSAGE AND ADMINISTRATION**

- Administer intravenously 25 mcg/kg within 5 minutes and then 0.15 mcg/kg/min for up to 18 hours. In patients with creatinine clearance  $\leq 60$  mL/min, give 25 mcg/kg within 5 minutes and then 0.075 mcg/kg/min. (2)

### **DOSAGE FORMS AND STRENGTHS**

- Injection: 12.5 mg/250mL (50 mcg/mL) in 250 mL bag (3)
- Injection: 5 mg/100mL (50 mcg/mL) in 100 mL bag. (3)
- Injection: 5 mg/100mL (50 mcg/mL) in 100 mL vial (3)
- Injection: 3.75 mg/15mL (250 mcg/mL) in 15 mL bolus vial (3)

### **CONTRAINDICATIONS**

- Known hypersensitivity to any component of AGGRASTAT. (4)
- History of thrombocytopenia with prior exposure to AGGRASTAT. (4)
- Active internal bleeding, or history of bleeding diathesis, major surgical procedure or severe physical trauma within the previous month. (4)

### **WARNINGS AND PRECAUTIONS**

- AGGRASTAT can cause serious bleeding. If bleeding cannot be controlled discontinue AGGRASTAT. (5.1)
- Thrombocytopenia: Discontinue AGGRASTAT and heparin. (5.2)

### **ADVERSE REACTIONS**

Bleeding is the most commonly reported adverse reaction. (6.1)

**To report SUSPECTED ADVERSE REACTIONS, contact Medicure at 1-800-509-0544 or FDA at 1-800-FDA-1088 or [www.fda.gov/medwatch](http://www.fda.gov/medwatch).**

### **DRUG INTERACTIONS**

- Coadministration of fibrinolytics, anticoagulants and antiplatelet agents, increases the risk of bleeding. (7)

### **USE IN SPECIFIC POPULATIONS**

- Renal Insufficiency: Reduce the dose in patients with severe renal insufficiency. (8.6)

**See 17 for PATIENT COUNSELING INFORMATION.**

**Revised: 12/2020**

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## **FULL PRESCRIBING INFORMATION**

### **1 INDICATIONS AND USAGE**

AGGRASTAT® is indicated to reduce the rate of thrombotic cardiovascular events (combined endpoint of death, myocardial infarction, or refractory ischemia/repeat cardiac procedure) in patients with non-ST elevation acute coronary syndrome (NSTEMI-ACS).

### **2 DOSAGE AND ADMINISTRATION**

#### **2.1 Recommended Dosage**

The recommended dosage is 25 mcg/kg administered intravenously within 5 minutes and then 0.15 mcg/kg/min for up to 18 hours.

## 2.2 Administration

For intravenous use only. Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration whenever solution and container permit.

To open the 100 mL or 250 mL premixed bag, first tear off its foil overpouch. The plastic may be somewhat opaque because of moisture absorption during sterilization; the opacity will diminish gradually. Check for leaks by squeezing the inner bag firmly; if any leaks are found or sterility is suspect then the solution should be discarded. Do not use unless the solution is clear and the seal is intact.

### Administration Instructions

1. Withdraw the bolus dose of AGGRASTAT from the 15 mL premixed bolus vial into a syringe. Alternatively, the bolus dose of AGGRASTAT may be administered from the 100 mL premixed vial or from the 100 mL or 250 mL premixed bag. Do not dilute. Administer the bolus dose within 5 minutes via a syringe or IV pump. For patients  $\geq 167$  kg, it is recommended that the bolus dose be administered via syringe from the 15 mL premixed bolus vial, to ensure that delivery time does not exceed 5 minutes.
2. Immediately following the bolus dose administration, administer the maintenance infusion from the 100 mL premixed vial, the 100 mL premixed bag or the 250 mL premixed bag via an IV pump.
3. Discard any unused portion left in the vial or bag.

The recommended bolus volume using the 15 mL premixed bolus vial can be calculated using the following equation:

$$\text{Bolus Volume (mL)} = \frac{25 \text{ mcg/kg} \times \text{body weight (kg)}}{250 \text{ mcg/mL}}$$

The recommended bolus volume using the 100 mL premixed vial, 100 mL premixed bag or 250 mL premixed bag can be calculated using the following equation:

$$\text{Bolus Volume (mL)} = \frac{25 \text{ mcg/kg} \times \text{body weight (kg)}}{50 \text{ mcg/mL}}$$

The recommended infusion rate for patients with CrCl (Creatinine Clearance)  $>60$  mL/min using the 100 mL premixed vial, 100 mL premixed bag or 250 mL premixed bag can be calculated using the following equation:

$$\text{Infusion Rate for CrCl} > 60 \text{ mL/min (mL/h)} = \frac{0.15 \text{ mcg/kg/min} \times \text{body weight (kg)} \times 60 \text{ min/h}}{50 \text{ mcg/mL}}$$

Example calculation of infusion rate for 60 kg patient with CrCl  $>60$  mL/min using the 100 mL premixed vial, 100 mL premixed bag or 250 mL premixed bag:

$$\text{Infusion Rate for CrCl} > 60 \text{ mL/min (mL/h)} = \frac{0.15 \text{ mcg/kg/min} \times 60 \text{ kg} \times 60 \text{ min/h}}{50 \text{ mcg/mL}} = 10.8 \text{ mL/h}$$

### Drug Compatibilities

AGGRASTAT can be administered in the same intravenous line as heparin, atropine sulfate, dobutamine, dopamine, epinephrine hydrochloride (HCl), famotidine injection, furosemide, lidocaine, midazolam HCl, morphine sulfate, nitroglycerin, potassium chloride, and propranolol HCl. Do not administer AGGRASTAT through the same IV line as diazepam. Do not add other drugs or remove solution directly from the bag with a syringe.

## **2.3 Dose Adjustment for Renal Impairment**

The recommended dosage in patients with  $\text{CrCl} \leq 60 \text{ mL/min}$  (calculated using the Cockcroft-Gault equation with actual body weight) is 25 mcg/kg intravenously within 5 minutes and then 0.075 mcg/kg/min, for up to 18 hours.

The recommended infusion rate for patients with  $\text{CrCl} \leq 60 \text{ mL/min}$  using the 100 mL premixed vial, 100 mL premixed bag or 250 mL premixed bag can be calculated using the following equation:

$$\text{Infusion Rate for CrCl} \leq 60 \text{ mL/min (mL/h)} = \frac{0.075 \text{ mcg/kg/min} \times \text{body weight (kg)} \times 60 \text{ min/h}}{50 \text{ mcg/mL}}$$

## **3 DOSAGE FORMS AND STRENGTHS**

AGGRASTAT is a clear, non-preserved, colorless, isosmotic, sterile premixed injection with sodium chloride for tonicity adjustment available in the following presentations:

**Table 1 AGGRASTAT Strength and Packaging**

<b>Strength</b>	<b>Volume - Packaging</b>
50 mcg/mL	250 mL - bag
50 mcg/mL	100 mL - bag
50 mcg/mL	100 mL - vial
250 mcg/mL	15 mL - bolus vial

## **4 CONTRAINDICATIONS**

AGGRASTAT is contraindicated in patients with:

- Severe hypersensitivity reaction to AGGRASTAT (i.e., anaphylactic reactions) [see *Adverse Reactions* (6.2)].
- A history of thrombocytopenia following prior exposure to AGGRASTAT [see *Adverse Reactions* (6.1)].
- Active internal bleeding or a history of bleeding diathesis, major surgical procedure or

severe physical trauma within the previous month [see *Adverse Reactions (6.1)*].

## **5 WARNINGS AND PRECAUTIONS**

### **5.1 General Risk of Bleeding**

Bleeding is the most common complication encountered during therapy with AGGRASTAT. Most bleeding associated with AGGRASTAT occurs at the arterial access site for cardiac catheterization. Minimize the use of traumatic or potentially traumatic procedures such as arterial and venous punctures, intramuscular injections, nasotracheal intubation, etc.

Concomitant use of fibrinolytics, anticoagulants and antiplatelet drugs increases the risk of bleeding.

### **5.2 Thrombocytopenia**

Profound thrombocytopenia has been reported with AGGRASTAT. Monitor platelet counts beginning about 6 hours after treatment initiation and daily thereafter. If the platelet count decreases to  $<90,000/\text{mm}^3$ , monitor platelet counts to exclude pseudothrombocytopenia. If thrombocytopenia is confirmed, discontinue AGGRASTAT and heparin. Previous exposure to a glycoprotein (GP) IIb/IIIa receptor antagonist may increase the risk of developing thrombocytopenia [see *Adverse Reactions (6.1)*].

## **6 ADVERSE REACTIONS**

### **6.1 Clinical Trial 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 clinical practice.

In the PRISM (Platelet Receptor Inhibition for Ischemic Syndrome Management), PRISM-PLUS (Platelet Receptor Inhibition for Ischemic Syndrome Management — Patients Limited by Unstable Signs and Symptoms) and RESTORE (Randomized Efficacy Study of Tirofiban for Outcomes and Restenosis) trials, 1946 patients received AGGRASTAT in combination with heparin and 2002 patients received AGGRASTAT alone for about 3 days. Forty-three percent of the population was  $>65$  years of age and approximately 30% of patients were female. In clinical studies with the recommended regimen (25 mcg/kg bolus followed by a 0.15 mcg/kg/min maintenance infusion), AGGRASTAT was administered in combination with aspirin, clopidogrel and heparin or bivalirudin to over 8000 patients for typically  $\leq 24$  hours. Approximately 30% of the population was  $>65$  years of age and approximately 25% were female.

#### Bleeding

##### *PRISM-PLUS Regimen*

The incidences of major and minor bleeding using the TIMI criteria in the PRISM-PLUS study are shown below.

**Table 2 TIMI Major and Minor Bleeding in PRISM-PLUS**

Bleeding (TIMI Criteria)*†	PRISM-PLUS (NSTE-ACS)	
	AGGRASTAT‡+ Heparin (n=773)	Heparin alone (n=797)
Major Bleeding	1.4%	0.8%
Minor Bleeding	10.5%	8.0%
Transfusions	4.0%	2.8%

\* Major = Hemoglobin drop of >5.0 g/dL with or without an identified site, intracranial hemorrhage, or cardiac tamponade.

† Minor = Hemoglobin drop of >3.0 g/dL with bleeding from a known site, spontaneous gross hematuria, hematemesis or hemoptysis.

‡ 0.4 mcg/kg/min initial infusion; 0.10 mcg/kg/min maintenance infusion.

The incidence rates of TIMI major bleeding in patients undergoing percutaneous procedures in PRISM-PLUS are shown below.

**Table 3 TIMI Major Bleeding Associated with Percutaneous Procedures in PRISM-PLUS**

	AGGRASTAT + Heparin		Heparin alone	
	N	%	N	%
Prior to Procedures	773	0.3	797	0.1
Following Angiography	697	1.3	708	0.7
Following PTCA	239	2.5	236	2.2

The incidence rates of TIMI major bleeding in patients undergoing coronary artery bypass graft surgery (CABG) in PRISM-PLUS within one day of discontinuation of AGGRASTAT were 17% on AGGRASTAT plus heparin (N=29) and 35% on heparin alone (N=31).

#### *Recommended ("High-Dose Bolus") Regimen*

Rates of major bleeds (including any intracranial, intraocular or retroperitoneal hemorrhage, clinically overt signs of hemorrhage associated with a drop in hemoglobin of >3 g/dL or any drop in hemoglobin by 4 g/dL, bleeding requiring transfusion of  $\geq 2$  U blood products, bleeding directly resulting in death within 7 days or hemodynamic compromise requiring intervention) were consistent with the rates observed in subjects administered the PRISM-PLUS regimen of AGGRASTAT. There was a trend toward greater bleeding in ST segment elevation myocardial infarction (STEMI) patients treated with fibrinolytics prior to administration of AGGRASTAT using the recommended regimen during rescue PCI.

#### Non-Bleeding

The incidences of non-bleeding adverse events that occurred at an incidence of >1% and numerically higher than control, regardless of drug relationship, are shown below:

**Table 4 Non-bleeding Adverse Reactions in PRISM-PLUS**

	AGGRASTAT + Heparin (N=1953) %	Heparin alone (N=1887) %
<i>Body as a Whole</i>		
Edema/swelling	2	1
Pain, pelvic	6	5
Reaction, vasovagal	2	1
<i>Cardiovascular System</i>		
Bradycardia	4	3
Dissection, coronary artery	5	4
<i>Musculoskeletal System</i>		
Pain, leg	3	2
<i>Nervous System/Psychiatric</i>		
Dizziness	3	2
<i>Skin and Skin Appendage</i>		
Sweating	2	1

### Thrombocytopenia

Patients treated with AGGRASTAT plus heparin, were more likely to experience decreases in platelet counts than were those on heparin alone. These decreases were reversible upon discontinuation of AGGRASTAT. The percentage of patients with a decrease of platelets to  $<90,000/\text{mm}^3$  was 1.5%, compared with 0.6% in the patients who received heparin alone. The percentage of patients with a decrease of platelets to  $<50,000/\text{mm}^3$  was 0.3%, compared with 0.1% of the patients who received heparin alone.

## **6.2 Post-Marketing Experience**

The following additional adverse reactions have been identified during post-approval use of AGGRASTAT. 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 the drug exposure.

*Hypersensitivity:* Severe allergic reactions including anaphylactic reactions have occurred during the first day of AGGRASTAT infusion, during initial treatment, and during readministration of AGGRASTAT. Some cases have been associated with severe thrombocytopenia (platelet counts  $<10,000/\text{mm}^3$ ). No information is available on the formation of antibodies to tirofiban.

## 7 DRUG INTERACTIONS

Concomitant use of fibrinolytics, anticoagulants and antiplatelet drugs increases the risk of bleeding.

## 8 USE IN SPECIFIC POPULATIONS

### 8.1 Pregnancy

#### Risk Summary

While published data cannot definitively establish the absence of risk, available published case reports have not established an association with tirofiban use during pregnancy and major birth defects, miscarriage, or adverse maternal or fetal outcomes. Untreated myocardial infarction can be fatal to the pregnant woman and fetus (see Clinical Considerations). Studies with tirofiban HCl at intravenous doses up to 5 mg/kg/day (about 5 and 13 times the maximum recommended daily human dose for rat and rabbit, respectively, when compared on a body surface area basis) have revealed no harm to the fetus.

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

#### Clinical Considerations

##### *Disease-associated maternal and/or embryo/fetal risk*

Myocardial infarction is a medical emergency in pregnancy which can be fatal to the pregnant woman and fetus if left untreated.

#### Data

##### *Animal Data*

There was no evidence of maternal or developmental toxicity in any of the studies in Table 5.

**Table 5 Developmental Toxicity Studies**

Type of Study	Species	Dose/Exposure*	Duration/Timing Exposure
(1) Range-finding	Rat (N=30)	1, 2, 5 mg/kg/day IV (N=10 per group)	Once daily from GD 6 through LD 20
(2) Developmental Toxicity	Rat (N=66)	1, 2, 5 mg/kg/day IV (N=22 per group)	Once daily from GD 6 through GD 20
(3) Developmental Toxicity with Postweaning Evaluation	Rat (N=66)	1, 2, 5 mg/kg/day IV (N=22 per group)	Once daily from GD 6 through LD 20
(4) Range-finding (non-pregnant)	Rabbit (N=21)	1, 2, 5 mg/kg/day IV	Once daily for 14 days



	(N=7 per group)	days
(5) Range-finding (pregnant)	Rabbit (N=30) 1, 2, 5 mg/kg/day IV (N=10 per group)	Once daily from GD 7 through GD 20
(6) Developmental Toxicity	Rabbit (N=60) 1, 2, 5 mg/kg/day IV (N=20 per group)	Once daily from GD 7 through GD 20
* 5 mg/kg/day is ~5 and 13 times the maximum recommended daily human dose for rat and rabbit, respectively, when compared on a body surface area basis.		

## 8.2 Lactation

### Risk Summary

There is no data on the presence of tirofiban in human milk, the effects of the drug on the breastfed infant, or the effects of the drug on human milk production. However, tirofiban is present in rat milk. The developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for AGGRASTAT and any potential adverse effects on the breastfed child from AGGRASTAT or from the underlying maternal condition.

## 8.4 Pediatric Use

Safety and effectiveness in pediatric patients have not been established.

## 8.5 Geriatric Use

Of the total number of patients in controlled clinical studies of AGGRASTAT, 43% were 65 years and over, while 12% were 75 years and over. With respect to efficacy, the effect of AGGRASTAT in the elderly ( $\geq 65$  years) appeared similar to that seen in younger patients ( $< 65$  years). Elderly patients receiving AGGRASTAT with heparin or heparin alone had a higher incidence of bleeding complications than did younger patients, but the incremental risk of bleeding in patients treated with AGGRASTAT in combination with heparin compared to the risk in patients treated with heparin alone was similar regardless of age. No dose adjustment is recommended for the elderly population [see *Dosage and Administration (2)*].

## 8.6 Renal Insufficiency

Patients with moderate to severe renal insufficiency have decreased plasma clearance of AGGRASTAT. Reduce the dosage of AGGRASTAT in patients with severe renal insufficiency [see *Dosage and Administration (2.3)* and *Clinical Pharmacology (12.3)*].

Safety and efficacy of AGGRASTAT has not been established in patients on hemodialysis.

## 10 OVERDOSAGE

In clinical trials, inadvertent overdosage with AGGRASTAT occurred in doses up to 2 times the recommended dose for initial infusion doses. Inadvertent overdosage occurred in doses up to 9.8 times the 0.15 mcg/kg/min maintenance infusion rate.

The most frequently reported manifestation of overdosage was bleeding, primarily minor

mucocutaneous bleeding events and minor bleeding at the sites of cardiac catheterization [see *Warnings and Precautions* (5.1)].

Overdosage of AGGRASTAT should be treated by assessment of the patient's clinical condition and cessation or adjustment of the drug infusion as appropriate.

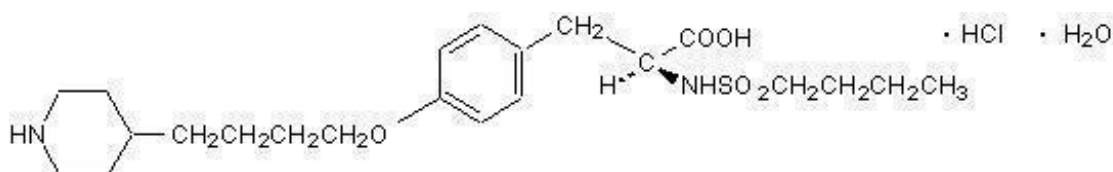
AGGRASTAT can be removed by hemodialysis.

## 11 DESCRIPTION

AGGRASTAT contains tirofiban hydrochloride, a non-peptide antagonist of the platelet GP IIb/IIIa receptor, which inhibits platelet aggregation.

Tirofiban hydrochloride monohydrate is chemically described as *N*-(butylsulfonyl)-*O*-[4-(4-piperidiny)butyl]-L-tyrosine monohydrochloride monohydrate.

Its molecular formula is  $C_{22}H_{36}N_2O_5S \cdot HCl \cdot H_2O$  and its structural formula is:



Tirofiban hydrochloride monohydrate is a white to off-white, non-hygroscopic, free-flowing powder, with a molecular weight of 495.08. It is very slightly soluble in water.

AGGRASTAT Injection Premixed is supplied as a sterile solution in water for injection, for intravenous use. The pH of the solution ranges from 5.5 to 6.5 adjusted with hydrochloric acid and/or sodium hydroxide.

Each 100 mL of the premixed, isosmotic intravenous injection contains 5.618 mg tirofiban hydrochloride monohydrate equivalent to 5 mg tirofiban (50 mcg/mL) and the following inactive ingredients: 0.9 g sodium chloride, 54 mg sodium citrate dihydrate, and 3.2 mg citric acid anhydrous.

Each 250 mL of the premixed, isosmotic intravenous injection contains 14.045 mg tirofiban hydrochloride monohydrate equivalent to 12.5 mg tirofiban (50 mcg/mL) and the following inactive ingredients: 2.25 g sodium chloride, 135 mg sodium citrate dihydrate, and 8 mg citric acid anhydrous.

AGGRASTAT Injection Premixed Bolus Vial is supplied as a sterile, isosmotic, concentrated solution for intravenous bolus injection, in 15 mL vials. No dilution is required. Each 15 mL of the premixed, isosmotic intravenous injection bolus vial contains 4.215 mg of tirofiban hydrochloride monohydrate equivalent to 3.75 mg of tirofiban and the following inactive ingredients: 120 mg sodium chloride, 40.5 mg sodium citrate dihydrate, and 2.4 mg citric acid anhydrous and water for injection.

## 12 CLINICAL PHARMACOLOGY

### 12.1 Mechanism of Action

AGGRASTAT is a reversible antagonist of fibrinogen binding to the GP IIb/IIIa receptor, the major platelet surface receptor involved in platelet aggregation. When administered

intravenously, AGGRASTAT inhibits *ex vivo* platelet aggregation in a dose- and concentration-dependent manner.

When given according to the PRISM-PLUS regimen of 0.4 mcg/kg/min over 30 minutes followed by a 0.1 mcg/kg/min maintenance infusion, >90% inhibition of platelet aggregation is attained by the end of the 30-minute infusion. When given according to the recommended regimen of 25 mcg/kg followed by a 0.15 mcg/kg/min maintenance infusion, >90% inhibition of platelet aggregation is attained within 10 minutes. Platelet aggregation inhibition is reversible following cessation of the infusion of AGGRASTAT.

## **12.2 Pharmacodynamics**

AGGRASTAT inhibits platelet function, as demonstrated by its ability to inhibit *ex vivo* adenosine phosphate (ADP)-induced platelet aggregation and prolong bleeding time in healthy subjects and patients with coronary artery disease. The time course of inhibition parallels the plasma concentration profile of the drug.

Following discontinuation of an infusion of AGGRASTAT 0.10 mcg/kg/min, *ex vivo* platelet aggregation returns to near baseline in 4 to 8 hours in approximately 90% of patients with coronary artery disease. The addition of heparin to this regimen does not significantly alter the percentage of subjects with >70% inhibition of platelet aggregation (IPA), but does increase the average bleeding time, as well as the number of patients with bleeding times prolonged to >30 minutes. Similar platelet aggregation recovery rates are observed following discontinuation of a 0.15 mcg/kg/min infusion.

## **12.3 Pharmacokinetics**

Tirofiban has a half-life of approximately 2 hours. It is cleared from the plasma largely by renal excretion, with about 65% of an administered dose appearing in urine and about 25% in feces, both largely as unchanged tirofiban. Metabolism appears to be limited.

Tirofiban is not highly bound to plasma proteins and protein binding is concentration independent over the range of 0.01 to 25 mcg/mL. The unbound fraction in human plasma is 35%. The steady state volume of distribution of tirofiban ranges from 22 to 42 liters.

In healthy subjects, the plasma clearance of tirofiban ranges from 213 to 314 mL/min. Renal clearance accounts for 39 to 69% of plasma clearance.

### Specific Populations

There is no effect on clearance of tirofiban by sex, race, age, or hepatic impairment.

#### *Renal Insufficiency*

Plasma clearance of tirofiban is decreased about 40% in subjects with creatinine clearance <60 mL/min and >50% in patients with creatinine clearance <30 mL/min, including patients requiring hemodialysis [see *Dosage and Administration* (2.3)]. Tirofiban is removed by hemodialysis.

## **13 NONCLINICAL TOXICOLOGY**

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

The carcinogenic potential of AGGRASTAT has not been evaluated.

Tirofiban HCl was negative in the *in vitro* microbial mutagenesis and V-79 mammalian cell mutagenesis assays. In addition, there was no evidence of direct genotoxicity in the *in vitro* alkaline elution and *in vitro* chromosomal aberration assays. There was no induction of chromosomal aberrations in bone marrow cells of male mice after the administration of intravenous doses up to 5 mg tirofiban/kg (about 3 times the maximum recommended daily human dose when compared on a body surface area basis).

Fertility and reproductive performance were not affected in studies with male and female rats given intravenous doses of tirofiban up to 5 mg/kg/day (about 5 times the maximum recommended daily human dose when compared on a body surface area basis).

## 14 CLINICAL STUDIES

Two large-scale clinical studies established the efficacy of AGGRASTAT in the treatment of patients with NSTEMI-ACS (unstable angina/non-ST elevation MI). The two studies examined AGGRASTAT alone and added to heparin, prior to and after percutaneous coronary revascularization (if indicated) (PRISM-PLUS) and in comparison to heparin in a similar population (PRISM). These trials are discussed in detail below.

### PRISM-PLUS (Platelet Receptor Inhibition for Ischemic Syndrome Management — Patients Limited by Unstable Signs and Symptoms)

In the double-blind PRISM-PLUS trial, 1570 patients with documented NSTEMI-ACS within 12 hours of entry into the study were randomized to AGGRASTAT (30 minute initial infusion of 0.4 mcg/kg/min followed by a maintenance infusion of 0.10 mcg/kg/min) in combination with heparin (bolus of 5,000 U followed by an infusion of 1,000 U/h titrated to maintain an activated partial thromboplastin time (APTT) of approximately 2 times control) or to heparin alone. All patients received concomitant aspirin unless contraindicated. Patients who were medically managed or who underwent revascularization procedures were studied. Patients underwent 48 hours of medical stabilization on study drug therapy, and they were to undergo angiography before 96 hours (and, if indicated, angioplasty/atherectomy, while continuing on AGGRASTAT and heparin for 12-24 hours after the procedure). AGGRASTAT and heparin could be continued for up to 108 hours. Exclusions included contraindications to anticoagulation, decompensated heart failure, platelet count  $<150,000/\text{mm}^3$ , and serum creatinine  $>2.5$  mg/dL. The mean age of the population was 63 years; 32% of patients were female and approximately half of the population presented with non-ST elevation myocardial infarction. On average, patients received AGGRASTAT for 71 hours.

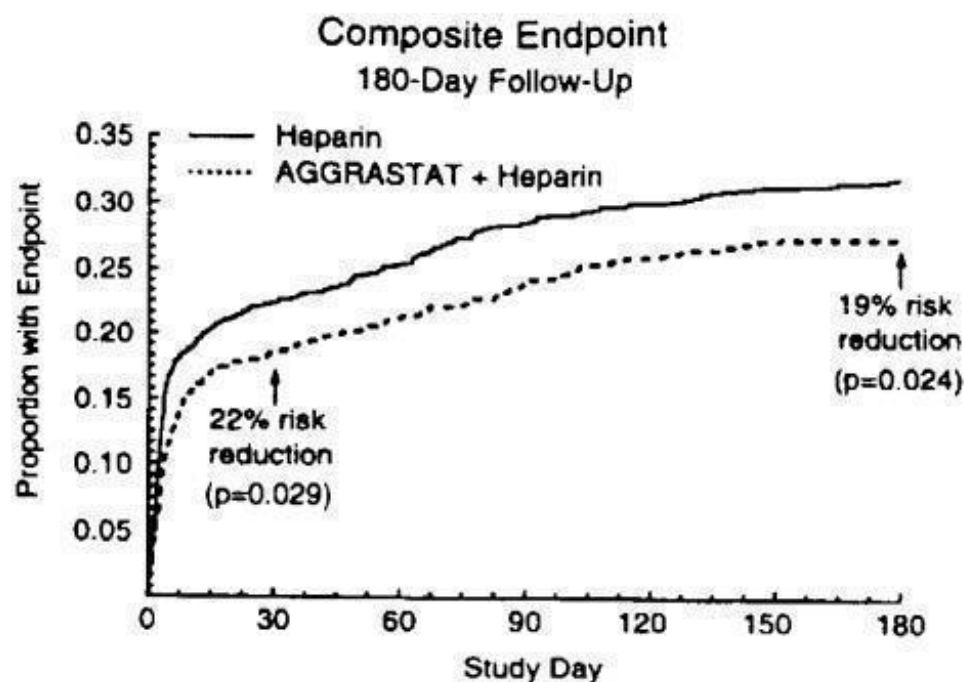
A third group of patients was initially randomized to AGGRASTAT alone (no heparin). This arm was stopped when the group was found, at an interim look, to have greater mortality than the other two groups.

The primary endpoint of the study was a composite of refractory ischemia, new MI and death within 7 days. There was a 32% risk reduction in the overall composite primary endpoint. The components of the composite were examined separately and the results are shown in Table 6. Note that the sum of the individual components may be greater than the composite (if a patient experiences multiple component events only one event counts towards the composite).

**Table 6 Primary Outcomes at 7 days in PRISM-PLUS**

Endpoint	AGGRASTAT+ Heparin (n=773)	Heparin (n=797)	Risk Reduction	p-value
Death, new MI, and refractory ischemia at 7 days	12.9%	17.9%	32%	0.004
Death	1.9%	1.9%	---	---
MI	3.9%	7.0%	47%	0.006
Refractory Ischemia	9.3%	12.7%	30%	0.023

The benefit seen at 7 days was maintained over time. The risk reduction in the composite endpoint at 30 days and 6 months is shown in the Kaplan-Meier curve below.



**Figure 1. Time to first event of death, new MI, or refractory ischemia in PRISM-PLUS**

An analysis of the results by sex suggests that women who are medically managed or who undergo subsequent percutaneous transluminal coronary angioplasty (PTCA)/atherectomy may receive less benefit from AGGRASTAT (95% confidence limits for relative risk of 0.61-1.74) than do men (0.43-0.89) ( $p=0.11$ ). This difference may be a true treatment difference, the effect of other differences in these subgroups, or a chance occurrence.

Approximately 90% of patients in the PRISM-PLUS study underwent coronary angiography and 30% underwent angioplasty/atherectomy during the first 30 days of the study. The majority of these patients continued on study drug throughout these procedures. AGGRASTAT was continued for 12-24 hours (average 15 hours) after angioplasty/atherectomy. The effects of AGGRASTAT at Day 30 did not appear to differ among sub-populations that did or did not receive PTCA or CABG, both prior to and

after the procedure.

### PRISM (Platelet Receptor Inhibition for Ischemic Syndrome Management)

In the PRISM study, a randomized, parallel, double-blind study, 3232 patients with NSTEMI-ACS intended to be managed without coronary intervention were randomized to AGGRASTAT (initial dose of 0.6 mcg/kg/min for 30 minutes followed by 0.15 mcg/kg/min for 47.5 hours) or heparin (5000-unit intravenous bolus followed by an infusion of 1000 U/h for 48 hours). The mean age of the population was 62 years; 32% of the population was female and 25% had non-ST elevation MI on presentation. Thirty percent had no ECG evidence of cardiac ischemia. Exclusion criteria were similar to PRISM-PLUS. The primary endpoint was the composite endpoint of refractory ischemia, MI or death at the end of the 48-hour drug infusion. The results are shown in Table 7.

**Table 7 Primary Outcomes in PRISM - Cardiac Ischemia Events**

Composite Endpoint (death, MI, or refractory ischemia)	AGGRASTAT (n=1616)	Heparin (n=1616)	Risk Reduction	p-value
2 Days (end of drug infusion)	3.8%	5.6%	33%	0.015
7 Days	10.3%	11.3%	10%	0.33

In the PRISM study, no adverse effect of AGGRASTAT on mortality at either 7 or 30 days was detected. This result is different from that in the PRISM-PLUS study, where the arm that included AGGRASTAT without heparin (N=345) was dropped at an interim analysis by the Data Safety Monitoring Committee for increased mortality at 7 days.

## **16 HOW SUPPLIED/STORAGE AND HANDLING**

AGGRASTAT is supplied as a clear, non-preserved, colorless, isosmotic, sterile premixed solution with sodium chloride for tonicity adjustment.

**Table 8 AGGRASTAT Product Details**

Strength	Total Amount	Packaging	NDC #
50 mcg/mL	12.5 mg/250 mL	bag	25208-002-02
50 mcg/mL	5 mg/100 mL	bag	25208-002-01
50 mcg/mL	5 mg/100 mL	vial	25208-002-03
250 mcg/mL	3.75 mg/15 mL	bolus vial	25208-001-04

FOR INTRAVENOUS USE ONLY

Store AGGRASTAT at controlled room temperature, 25°C (77°F) with excursions permitted between 15-30°C (59-86°F) [see USP Controlled Room Temperature]. Do not freeze. Protect from light during storage.

## **17 PATIENT COUNSELING INFORMATION**

Advise patients to watch closely for any signs of bleeding or bruising and to report these to their health care provider when they occur.

Advise patients to discuss with their health care provider their use of any other medications, including over-the-counter or herbal products prior to AGGRASTAT use.

Patent: [www.medicure.com/aggrastat/patents](http://www.medicure.com/aggrastat/patents)

AGGRASTAT is manufactured for:

MEDICURE INTERNATIONAL, INC.

by:

EMERGENT BIOSOLUTIONS

Baltimore, Maryland 21230 USA

And

LABORATORIOS GRIFOLS S.A

08150 Parets del Vallès (Barcelona), Spain

Distributed by:

MEDICURE PHARMA, INC.

Princeton, NJ 08540 USA

1-800-509-0544

PIM-10

\* Registered trademark of Medicure International, Inc.

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**Label 12.5 mg/250 mL - Bag**

**RECOMMENDED FOR USE WITH CALIBRATED INFUSION DEVICE**

**12.5 mg per 250 mL (50 mcg per mL)**

**AGGRASTAT®**

**(TIROFIBAN HYDROCHLORIDE) INJECTION**

**SINGLE-DOSE CONTAINER**

**250 mL**

**NDC 25208-002-02**

**PREMIXED**

**ISO-OSMOTIC**

**Rx ONLY**

**STERILE NONPYROGENIC**

Each 250 mL contains: Tirofiban hydrochloride equivalent to 12.5 mg tirofiban, 2.25 g sodium chloride, 135 mg sodium citrate dihydrate, 8 mg citric acid anhydrous, Water for Injection. pH may have been adjusted with hydrochloric acid and/or sodium hydroxide.

Usual Dosage: Intravenously as directed by a physician. See package insert.

Cautions: Do not add supplementary medication. Check for minute leaks by squeezing bag firmly. If leaks are found discard bag as sterility may be impaired. Do not use in series connections.

Do not use unless solution is clear.

Recommended storage: Store at 25°C (77°F) with excursions permitted between 15°- 30°C (59° - 86°F) (See USP Controlled Room Temperature). Do not freeze. Protect from light during storage.

AGGRASTAT® is a registered trademark of Medicure International, Inc.

Manufactured for Medicure International, Inc.

By Laboratorios Grifols S.A.

08150 Parets del Vallès (Barcelona), Spain

Distributed by Medicure Pharma, Inc.

Princeton, NJ 08540 USA

AG-IV-250-03



(01)00325208002022

4000557



J3246

**Container 12.5 mg/250 mL - Bag**



**NDC 25208-002-02**  
**PROTECT FROM LIGHT DURING STORAGE**  
**RECOMMENDED FOR USE WITH CALIBRATED INFUSION DEVICE**  
**PREMIXED INJECTION**

**AGGRASTAT<sup>®</sup>**

(tirofiban hydrochloride) Injection

**12.5 mg per 250 mL**

(50 mcg per mL)

**Single-Dose Container**

**250 mL**  
Rx Only

**Iso-osmotic**

**Sterile Nonpyrogenic**

**Each 250 mL contains:** Tirofiban hydrochloride equivalent to 12.5 mg tirofiban, 2.25 g sodium chloride, 135 mg sodium citrate dihydrate, 8 mg citric acid anhydrous, Water for Injection. pH may have been adjusted with hydrochloric acid and/or sodium hydroxide.

**Usual Dosage:** Intravenously as directed by a physician. See package insert.

**Cautions:** Do not add supplementary medication. Check for minute leaks by squeezing bag firmly. If leaks are found discard bag as sterility may be impaired. Do not use in series connections. Do not use unless solution is clear.

**Recommended storage:** Store at 25°C (77°F) with excursions permitted between 15° - 30°C (59° - 86°F) (see USP Controlled Room Temperature). Do not freeze. Protect from light during storage.

AGGRASTAT<sup>®</sup> is a registered trademark of  
Medicure International, Inc.  
Patent: [www.medicure.com/aggrastat/patents](http://www.medicure.com/aggrastat/patents)

Manufactured for:

**Medicure International, Inc.**

by: **Laboratorios Grifols S.A.**

08150 Parets del Vallès (Barcelona), Spain

Distributed by:

**Medicure Pharma, Inc.**

Princeton, NJ 08540 USA

J3246

**medicure<sup>®</sup>**  
pharma

AG-FQ-WI-250-03

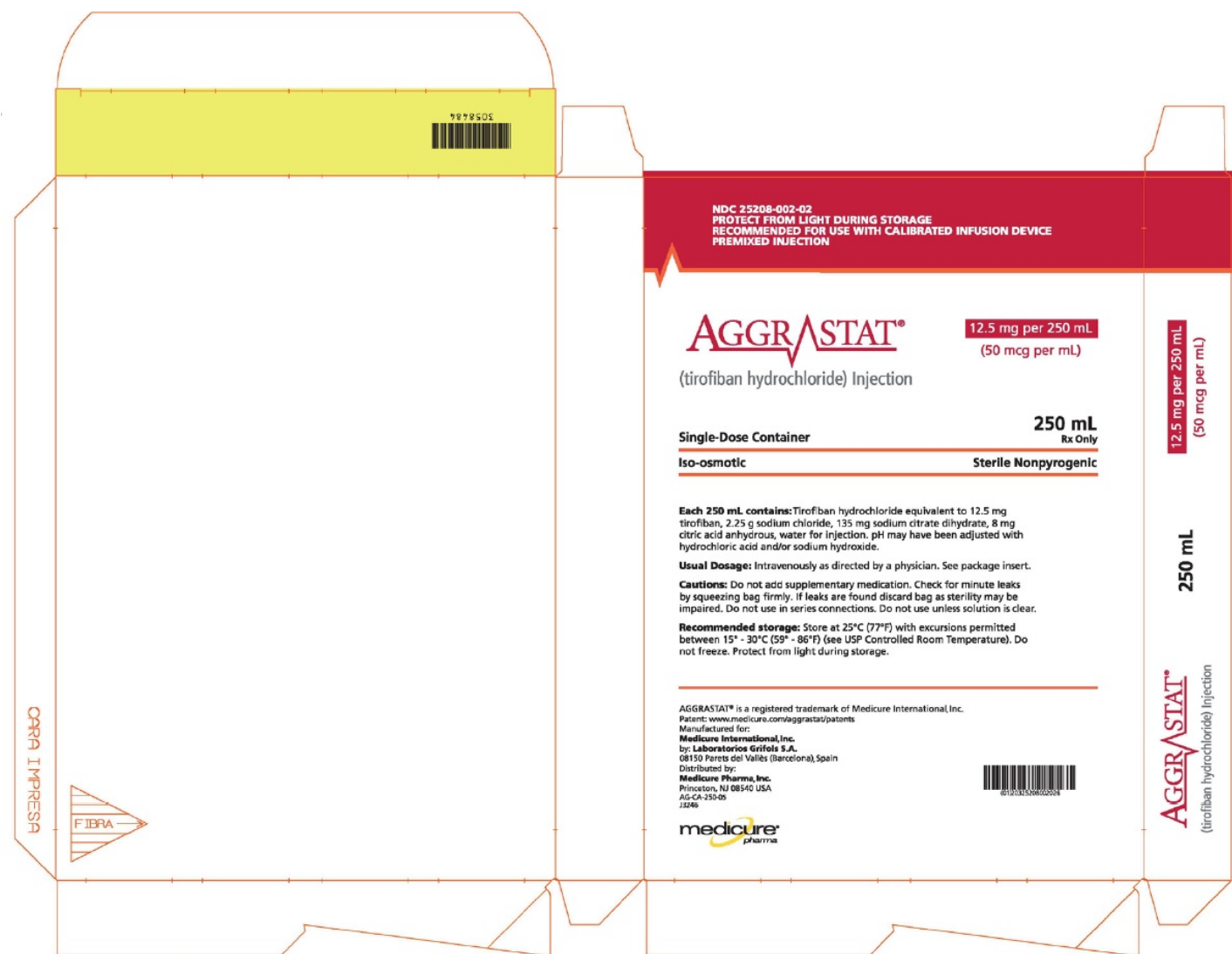


99958366



001103052108000000

Carton



Carton 3.75 mg/15 mL - Bolus vial

<div style="text-align: right;"> <b>GS1 Data Matrix</b>            GTIN 10325208001046            SN XXXXXXXXXX            LOT XXXXXXXXXX            EXP         </div>			
<b>3.75 mg per 15 mL</b> <b>(250 mcg per mL)</b> <b>PREMIXED INJECTION</b> <b>FOR BOLUS</b>			
<b>NDC 25208-001-04</b>		<b>USUAL ADULT DOSAGE:</b> See accompanying insert.	
 (tirofiban hydrochloride) Injection <div style="border: 1px solid black; padding: 2px; display: inline-block;"> <b>3.75 mg per 15 mL</b>  <b>(250 mcg per mL)</b> </div> <b>PROTECT FROM LIGHT</b> <b>DURING STORAGE</b> <b>FOR INTRAVENOUS USE ONLY</b> <b>Rx Only</b> <span style="float: right;">J3246</span>		Each mL contains tirofiban hydrochloride equivalent to 0.25 mg of tirofiban and the following inactive ingredients: 0.16 mg citric acid anhydrous, 2.7 mg sodium citrate dihydrate, 8 mg sodium chloride, and water for injection. The pH may have been adjusted with hydrochloric acid and/or sodium hydroxide.  Store at 25°C (77°F) with excursions permitted between 15-30°C (59-86°F) (see USP Controlled Room Temperature). Do not freeze. Protect from light during storage.  <b>SINGLE-DOSE VIAL – DISCARD UNUSED PORTION</b>  Distributed by Medicure Pharma, Inc. Princeton, NJ 08540 USA  	
<b>15 mL</b>		Manufactured for Medicure International, Inc. by Emergent BioSolutions Baltimore, MD 21230 USA  <b>15 mL</b>	
		 (01)10325208001046	
		AG-CA-15-02	

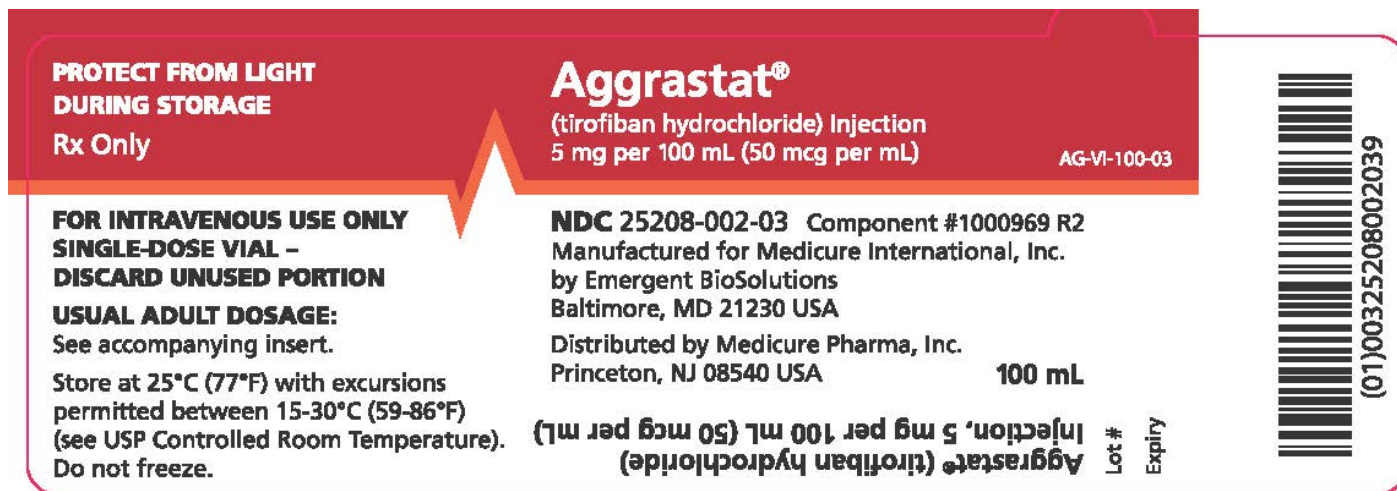
### Label 3.75 mg/15 mL - Bolus vial

<b>PROTECT FROM LIGHT</b> <b>DURING STORAGE</b> <b>Rx Only</b> <span style="float: right;">AG-VI-15-02</span>		<b>Aggrastat®</b> <b>(tirofiban hydrochloride) Injection</b> <b>3.75 mg per 15 mL (250 mcg per mL)</b>	
<b>FOR INTRAVENOUS USE ONLY</b> <b>SINGLE-DOSE VIAL – DISCARD UNUSED PORTION</b> <b>USUAL ADULT DOSAGE:</b> See accompanying insert.		<b>NDC 25208-001-04</b> Component #1000970 R1 Manufactured for Medicure International, Inc. by Emergent BioSolutions Baltimore, MD 21230 USA Distributed by Medicure Pharma, Inc. Princeton, NJ 08540 USA See carton for storage instructions. <b>15 mL</b>	
		<b>Lot #</b>	<b>Expiry</b>
		 (01)00325208001049	

### Carton 5 mg/100 mL - Vial



## Label 5 mg/100 mL - Vial



## Carton 5 mg/100 mL - Bag





**Pouch 5 mg/100 mL - Bag**

NDC 25208-002-01  
PROTECT FROM LIGHT DURING STORAGE  
RECOMMENDED FOR USE WITH CALIBRATED INFUSION DEVICE  
PREMIXED INJECTION

**AGGRASTAT®**

(tirofiban hydrochloride) Injection

5 mg per 100 mL

(50 mcg per mL)

Single-Dose Container

**100 mL**

Rx Only

Iso-osmotic

Sterile Nonpyrogenic

Each 100 mL contains: Tirofiban hydrochloride equivalent to 5 mg tirofiban, 900 mg sodium chloride, 54 mg sodium citrate dihydrate, 3.2 mg citric acid anhydrous, Water for injection. pH may have been adjusted with hydrochloric acid and/or sodium hydroxide.

**Usual Dosage:** Intravenously as directed by a physician. See package insert.

**Cautions:** Do not add supplementary medication. Check for minute leaks by squeezing bag firmly. If leaks are found discard bag as sterility may be impaired. Do not use in series connections. Do not use unless solution is clear.

**Recommended storage:** Store at 25°C (77°F) with excursions permitted between 15-30°C (59-86°F) (See USP Controlled Room Temperature). Do not freeze. Protect from light during storage.

AGGRASTAT® is a registered trademark of  
Medicare International, Inc.

Patent: [www.medicare.com/aggrastat/patents](http://www.medicare.com/aggrastat/patents)

Manufactured for:

Medicare International, Inc.

by: Laboratorios Grifols S.A.

08150 Parets del Vallès (Barcelona), Spain

Distributed by:

Medicare Pharma, Inc.

Princeton, NJ 08540 USA

13246

**medicare®**  
pharma

AG-FO-WI-100-01



305839Z



(01)1032 520800201Z

RECOMMENDED FOR USE WITH CALIBRATED INFUSION DEVICE  
5 mg per 100 mL (50 mcg per mL)

**AGGRASTAT®**  
**(TIROFIBAN HYDROCHLORIDE) INJECTION**

SINGLE-DOSE CONTAINER      100 mL      NDC 25208-002-01  
PREMIXED ISO-OSMOTIC      Rx ONLY      STERILE NONPYROGENIC

Each 100 mL contains: Tirofiban hydrochloride equivalent to 5 mg tirofiban, 900 mg sodium chloride, 54 mg sodium citrate dihydrate, 3.2 mg citric acid anhydrous, Water for Injection. pH may have been adjusted with hydrochloric acid and/or sodium hydroxide.

Usual Dosage: Intravenously as directed by a physician.  
See package insert.

Cautions: Do not add supplementary medication. Check for minute leaks by squeezing bag firmly. If leaks are found discard bag as sterility may be impaired. Do not use in series connections.

Do not use unless solution is clear.

Recommended storage: Store at 25°C (77°F) with excursions permitted between 15-30°C (59-86°F) (See USP Controlled Room Temperature).

Do not freeze. Protect from light during storage.

4000646



(01)00325208002015

Distributed by Medisure Pharma, Inc. Princeton, NJ 08540 USA  
AG-IV-100-01 J3246 Manufactured in Spain

AGGRASTAT

tirofiban injection, solution

Product Information			
Product Type	HUMAN PRESCRIPTION DRUG	Item Code (Source)	NDC:25208-002
Route of Administration	INTRAVENOUS		

Active Ingredient/Active Moiety		
Ingredient Name	Basis of Strength	Strength
TIROFIBAN HYDROCHLORIDE (UNII: 6H925F8O5J) (TIROFIBAN - UNII:GGX234SI5H)	TIROFIBAN	5 mg in 100 mL

Inactive Ingredients	
Ingredient Name	Strength
ANHYDROUS CITRIC ACID (UNII: XF417D3PSL)	3.2 mg in 100 mL
TRISODIUM CITRATE DIHYDRATE (UNII: B22547B95K)	54 mg in 100 mL
SODIUM CHLORIDE (UNII: 451W47IQ8X)	900 mg in 100 mL
WATER (UNII: 059QF0KO0R)	

Packaging				
#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:25208-002-02	1 in 1 CARTON	05/14/1998	
1		250 mL in 1 CONTAINER; Type 0: Not a Combination Product		
2	NDC:25208-002-03	1 in 1 CARTON	10/15/2016	
2		100 mL in 1 VIAL, GLASS; Type 0: Not a Combination Product		
3	NDC:25208-002-01	1 in 1 CARTON	12/24/2020	
3		100 mL in 1 BAG; Type 0: Not a Combination Product		

Marketing Information			
Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
NDA	NDA020913	05/14/1998	

AGGRASTAT

tirofiban injection, solution



Product Information						
Product Type		HUMAN PRESCRIPTION DRUG	Item Code (Source)	NDC:25208-001		
Route of Administration		INTRAVENOUS				
Active Ingredient/Active Moiety						
Ingredient Name			Basis of Strength	Strength		
TIROFIBAN HYDROCHLORIDE (UNII: 6H925F8O5J) (TIROFIBAN - UNII:GGX234SI5H)			TIROFIBAN	3.75 mg in 15 mL		
Inactive Ingredients						
Ingredient Name			Strength			
ANHYDROUS CITRIC ACID (UNII: XF417D3PSL)			2.4 mg in 15 mL			
TRISODIUM CITRATE DIHYDRATE (UNII: B22547B95K)			40.5 mg in 15 mL			
SODIUM CHLORIDE (UNII: 451W47IQ8X)			120 mg in 15 mL			
WATER (UNII: 059QF0KO0R)						
Packaging						
#	Item Code	Package Description	Marketing Start Date	Marketing End Date		
1	NDC:25208-001-04	1 in 1 CARTON	10/15/2016			
1		15 mL in 1 VIAL, GLASS; Type 0: Not a Combination Product				
Marketing Information						
Marketing Category		Application Number or Monograph Citation	Marketing Start Date	Marketing End Date		
NDA		NDA020912	10/15/2016			

**Labeler** - Medicure International Inc (860240324)

**Registrant** - Medicure International Inc (860240324)

## Establishment

Name	Address	ID/FEI	Business Operations
Baxter Healthcare Corporation		059140764	manufacture(25208-002) , analysis(25208-002) , pack(25208-002) , label(25208-002)

## Establishment

Name	Address	ID/FEI	Business Operations
Cangene BioPharma, LLC		050783398	manufacture(25208-001, 25208-002) , analysis(25208-001, 25208-002) , pack(25208-001, 25208-002) , label(25208-001, 25208-002)

Establishment			
Name	Address	ID/FEI	Business Operations
Laboratorios Grifols, S.A.		463719725	manufacture(25208-002) , label(25208-002) , pack(25208-002)

Revised: 11/2023

Medicure International Inc