**High Alert**

### bivalirudin (bi-val-i-roo-din)

#### Synonyms

- Angiomax

#### Classification

- **Therapeutic:** anticoagulants
- **Pharmacologic:** thrombin inhibitors

#### Pregnancy Category

- B

### Indications

Used in conjunction with aspirin to reduce the risk of acute ischemic complications in patients with unstable angina who are undergoing percutaneous transluminal angioplasty (PTCA) or percutaneous coronary intervention (PCI). Patients with or at risk of heparin-induced thrombocytopenia (HIT) and thrombosis syndrome (HITTS) who are undergoing PCI.

#### Action

Specifically and reversibly inhibits thrombin by binding to its receptor sites. Inhibition of thrombin prevents activation of factors V, VIII, and XII; the conversion of fibrinogen to fibrin; platelet adhesion and aggregation.

#### Therapeutic Effects:

- Decreased acute ischemic complications in patients with unstable angina (death, MI, or the urgent need for revascularization procedures).

### Pharmacokinetics

- **Absorption:** IV administration results in complete bioavailability.
- **Distribution:** Unknown.
- **Metabolism and Excretion:** Cleared from plasma by a combination of renal mechanisms and proteolytic breakdown.
- **Half-life:** 25 min (q in renal impairment).

#### TIME/ACTION PROFILE (anticoagulant effect)

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
</tr>
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<tbody>
<tr>
<td>IV</td>
<td>immediate</td>
<td>unknown</td>
<td>1–2 hr</td>
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### Contraindications/Precautions

- **Contraindicated in:** Active major bleeding; Hypersensitivity.

#### Adverse Reactions/Side Effects

- **CNS:** headache, anxiety, insomnia, nervousness.
- **CV:** hypotension, bradycardia, hypotension.
- **GI:** nausea, abdominal pain, dyspepsia, vomiting.
- **Hemat:** BLEEDING.
- **Local:** injection site pain.
- **MS:** back pain.
- **Misc:** pain, fever, pelvic pain.

### Interactions

- **Drug-Drug:** Risk of bleeding may be increased by concurrent use of abciximab, heparin, low molecular weight heparins, clopidogrel, thrombolytics, or any other drugs that inhibit coagulation.
- **Drug-Natural Products:** Risk of bleeding with arnica, chamomile, clove, dong-quai, feverfew, garlic, ginger, ginkgo, Panax ginseng, and others.

### Route/Dosage

#### IV (Adults):

- **0.75 mg/kg** as a bolus injection, followed by an infusion at a rate of 1.75 mg/kg/hr for the duration of the PCI procedure. An activated clotting time (ACT) should be performed 5 min after bolus dose and an additional bolus dose of 0.3 mg/kg may be administered if needed. Continuation of the infusion (at a rate of 1.75 mg/kg/hr) for up to 4 hr post-procedure is optional. If needed, the infusion may be continued beyond this initial 4 hr at a rate of 0.2 mg/kg/hr for up to 20 hr. Therapy should be initiated prior to the procedure and given in conjunction with aspirin.

- **Renal Impairment**
  - **IV (Adults):** No adjustment needed in any patient with renal impairment. GFR 10–29 mL/min—infusion rate to 1 mg/kg/hr; Dialysis-dependent patients—infusion rate to 0.25 mg/kg/hr. ACT should be monitored in all patients with renal impairment.

### Nursing Implications

- **Assessment:**
  - Monitor for bleeding. Most common is oozing from the arterial access site for cardiac catheterization. Arterial and venous punctures, IV injections, and use of urinary catheters, nasotracheal intubation, and nasogastric tubes should be minimized. Noncompressible sites for IV access should be avoided.

- **Common Drug Interactions:** Indicated by **●**. **RMON** indicates relative monitoring considerations. **QFT** indicates quick facts. **r** indicates rare. **i** indicates infant. **p** indicates pediatric. **H** indicates high alert. **O** indicates order. **D** indicates dose.

- **Adverse Reactions:** Indicated by **●**. **H** indicates high alert. **O** indicates order. **D** indicates dose. **RMON** indicates relative monitoring considerations. **QFT** indicates quick facts. **r** indicates rare. **i** indicates infant. **p** indicates pediatric.
should be avoided. If bleeding cannot be controlled with pressure, discontinue bivalirudin immediately.

- Monitor vital signs. May cause hypotension or hypertension. An unexplained decrease in BP may indicate hemorrhage.

- Lab Test Considerations: Assess hemoglobin, hematocrit, and platelet count prior to bivalirudin therapy and periodically during therapy. May cause hemoglobin and hematocrit to decrease. In hemostasis-indicate hemorrhage.

- Monitor ACT periodically in patients with renal dysfunction.

Potential Nursing Diagnoses
- Ineffective Tissue Perfusion (Indications)

Implementation
- Administration Site: Intravenous (IV) injection

- pH: 5.0–6.0.

- Direct IV: (for bolus dose) Reconstitute each 250-mg vial with 5 mL of sterile water for injection. Reconstituted vials are stable for 24 hr if refrigerated. Further dilute in 50 mL of D5W or 0.9% NaCl. Bolus dose out of bag. Infusion is stable for 24 hr at room temperature. Concentration: Final concentration is 5 mg/mL. Rate: Administer as a bolus injection.

- Intermittent Infusion: Reconstitute each 250-mg vial as per the above directions. Further dilute in 50 mL of D5W or 0.9% NaCl. Infusion is to be continued after 4 hr (at a rate of 0.2 mg/kg/hr). Reconstituted vials should be diluted in 500 mL of D5W or 0.9% NaCl. Infusion is stable for 24 hr at room temperature. Concentration: 5 mg/mL (for infusion rate of 1.75 mg/kg/hr); 0.5 mg/mL (for infusion rate of 0.2 mg/kg/hr). Rate: Based on patient’s weight (see Route/Dosage section).

- Y-Site Compatibility: acyclovir, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amphotericin B liposome, ampicillin, ampicillin-sulbactam, anidulafungin, argatroban, arsenic trioxide, atracurium, atropine, azithromycin, aztreonam, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium chloride, calcium gluconate, carboplatin, carmustine, cefazolin, cefepime, ceftriaxone, cefuroxime, chloramphenicol, cimetidine, cidoproxil, cisatracurium, cisplatin, clindamycin, cyclophosphamide, cyclosporine, cyanuric acid, dactinomycin, daunorubicin, docetaxel, docetaxel, doxorubicin, doxorubicin phosphate, doxycycline, droperidol, epidural, epinephrine, erythromycin, esmolol, etoposide, etrapizumab, famotidine, fenbendazole, fentanyl, foscarnet, fosphenytoin, fosphenytoin sodium, furosemide, garenoxacin, garenoxacin monophosphate, gatifloxacin, gemcitabine, gemcitabine hydrochloride, gemcitabine hydrochloride monohydrate, gemcitabine hydrochloride monohydrate succinate, ganciclovir, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydroxyzine, hydrocortisone, hydrocortisone sodium succinate, hydromorphone, idarubicin, ifosfamide, imipenem, imipenem/cilastatin, insulin, irinotecan, isoproterenol, ketamine, ketorolac, labetalol, lanreotide, leucovorin, leuprolide, levobunolol, levofloxacin, lidocaine, linezolid, lorazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meldepine, melphalan, melfalan, mesna, mesna, methotrexate, methyldopa, methylnaltrexone, melphalan, metoprolol, metronidazole, methylprednisolone, metoprolol succinate, meperidine, midazolam, mitomycin, mitoxantrone, morphine, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, nicardipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxapetine, paclitaxel, palonosetron, pamidronate, pancuronium, pamidronate, pentobarbital, phenobarbital, phenylephrine, piperacillin-tazobactam, potassium acetate, potassium chloride, potassium phosphate, procainamide, procainamide, promethazine, ranitidine, recombinant human insulin, sodium acetate, sodium bicarbonate, sodium phosphate, streptomycin, sucralfate, succinylcholine, sucrose, suxamethonium, tacrolimus, temafosin, temafosin furtado, teniposide, theophylline, thiopental, thiotaconazole, ticarcillin, ticarcillin, tobramycin, topotecan, trimethoprim/sulfamethoxazole, vancomycin, verapamil, vinblastine, vincristine, vinorelbine, voriconazole, warfarin, zidovudine, zoledronic acid.

- Y-Site Incompatibility: alteplase, amiodarone, amphotericin B lipid complex, captopril, chlorpromazine, dantrolene, dapsone, dexamethasone, dextran, doripenem, doxorubicin liposome, doxycycline, droperidol, epidural, epinephrine, erythromycin, esmolol, etoposide, etrapizumab, famotidine, fenbendazole, fentanyl, foscarnet, fosphenytoin, fosphenytoin sodium, furosemide, garenoxacin, garenoxacin monophosphate, gatifloxacin, gemcitabine, gemcitabine hydrochloride, gemcitabine hydrochloride monohydrate, gemcitabine hydrochloride monohydrate succinate, ganciclovir, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydroxyzine, hydrocortisone, hydrocortisone sodium succinate, hydromorphone, idarubicin, ifosfamide, imipenem, imipenem/cilastatin, insulin, irinotecan, isoproterenol, ketamine, ketorolac, labetalol, lanreotide, leucovorin, leuprolide, levobunolol, levofloxacin, lidocaine, linezolid, lorazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meldepine, melphalan, melfalan, mesna, mesna, methotrexate, methyldopa, methylnaltrexone, melphalan, metoprolol, metronidazole, methylprednisolone, metoprolol succinate, meperidine, midazolam, mitomycin, mitoxantrone, morphine, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, nicardipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxapetine, paclitaxel, palonosetron, pamidronate, pancuronium, pamidronate, pentobarbital, phenobarbital, phenylephrine, piperacillin-tazobactam, potassium acetate, potassium chloride, potassium phosphate, procainamide, procainamide, promethazine, ranitidine, recombinant human insulin, sodium acetate, sodium bicarbonate, sodium phosphate, streptomycin, sucralfate, succinylcholine, sucrose, suxamethonium, tacrolimus, temafosin, temafosin furtado, teniposide, theophylline, thiopental, thiotaconazole, ticarcillin, ticarcillin, tobramycin, topotecan, trimethoprim/sulfamethoxazole, vancomycin, verapamil, vinblastine, vincristine, vinorelbine, voriconazole, warfarin, zidovudine, zoledronic acid.

- Patient/Family Teaching
  - Inform patient of the purpose of bivalirudin.
  - Instruct patient to notify health care professional immediately if any bleeding is noted.
CONTINUED
bivalirudin

Evaluation/Desired Outcomes

- Decreased acute ischemic complications in patients with unstable angina (death, MI or the urgent need for revascularization procedures).

Why was this drug prescribed for your patient?