alteplase (al-te-plase)
Activator, Calcium-activated, tissue plasminogen activator, t-PA

Classification
Therapeutic: Thrombolytics
Pharmacologic: Plasminogen activators

Pregnancy Category C.

Indications

Unlabeled Use:
Deep venous thrombosis (DVT). Acute peripheral arterial thrombosis.

Action
Directly converts plasminogen to plasmin, which then degrades clot-bound fibrin, and reduced risk of heart failure or death. Lysis of plasminogen to plasmin, reducing risk of myocardial or cerebral emboli. Restoration of cannula or catheter function.

Pharmacokinetics
Absorption: Complete after IV administration. Intracoronary administration or administration into occluded catheters or cannulae has a more localized effect.

Distribution: Unknown.

Metabolism and Excretion: Rapidly metabolized by the liver.

Half-life: 35 min.

TIME/ACTION PROFILE (fibrinolysis)

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ROUTE ONSET PEAK DURATION
IV 30 mi 60 min unknown
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Contraindications/Precautions
Contraindicated in:
- Active internal bleeding
- History of cerebrovascular accident (for MI and PE only)
- Recent (within 3 mo) intracranial or intraspinal injury or trauma
- Intracranial neoplasm, arteriovenous malformation, or aneurysm
- Known bleeding diathesis
- Severe uncontrolled hypertension (systolic BP > 185 mmHg or diastolic BP > 110 mmHg specifically for stroke indication)
- Evidence or suspicion of intracranial hemorrhage on pretreatment evaluation (for stroke indication only)
- Recanalization within 3 min (for stroke indication only)
- History of intracranial hemorrhage (for stroke indication only)
- Severe uncontrolled hypertension (for stroke indication only), current use of oral anticoagulants or an INR > 1.7 or a prothrombin time > 15 sec (for stroke indication only).
- Administration of heparin 48 hr before the onset of stroke with an elevated aPTT at presentation (for stroke indication only). Platelet count > 100,000/mm3 (for stroke indication only)
- Hypersensitivity (for central venous access device occlusion indication only).

Use Cautiously in:
- Recent (within 10 days) major surgery, trauma, GI or GU bleeding
- Cerebrovascular disease
- Systolic BP > 175 mmHg and/or diastolic BP > 110 mmHg
- High likelihood of left heart thrombus
- Hemostatic defects
- Severe hepatic impairment
- Hemorrhagic ophthalmic conditions
- Septic thrombophlebitis
- Previous puncture of a noncompressible vessel
- Subacute bacterial endocarditis or acute pericarditis
- Severe neurological deficit (NIHSS > 22) at presentation (for stroke indication only)
- Major early infarct signs on CT scan (for stroke indication only)

Adverse Reactions/Side Effects
CNS:
- Intracranial hemorrhage.

EENT:
- Epistaxis, gingival bleeding.

Resp:
- Bronchospasm, hemoptysis.

CV:
- Reperfusion arrhythmias, hypotension

GI:
- GI bleeding, nausea, retroperitoneal bleeding, vomiting.

GU:
- GU tract bleeding.

Derm:
- Ecchymoses, flushing, urticaria.

Hemat:
- Bleeding.

Local:
- Hemorrhage at injection site, phlebitis at injection site.

Other:
- Allergic reactions including anaphylaxis, fever.

Interactions
Drug-Drug: Aspirin, other NSAIDs, warfarin, heparin and heparin-like agents, dextran, epsilon-aminocaproic acid, tranexamic acid — concurrent use increases risk of bleeding, although these agents are frequently used together or in sequence. Effectiveness may be improved by antifibrinolytic agents, including epsilon-aminocaproic acid or tranexamic acid.

Drug-Food: None known.

Drug-Lifestyle: None known.

Drug-Lab Test: None known.

Exercise Extreme Caution in:
- Patients receiving concurrent anticoagulant therapy (increases risk of intracranial bleeding).

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Drug-Food: None known.

Drug-Lifestyle: None known.

Drug-Lab Test: None known.
Route/Dosage

Myocardial Infarction (Accelerated or Front-Loaded Regimen)

- IV (Adults): 15 mg bolus, then 0.75 mg/kg (up to 50 mg) over 30 min, then 0.5 mg/kg (up to 35 mg) over next 60 min; usually accompanied by heparin therapy.

Myocardial Infarction (Standard Regimen)

- IV (Adults): 60 mg over 1st hr (6–10 mg given as a bolus over first 1–2 min), 20 mg over the 2nd hr, and 20 mg over the 3rd hr for a total dose of 100 mg.
- IV (Adults): 0.75 mg/kg over 1st hr (0.075–0.125 mg/kg given as a bolus over first 1–2 min), 0.25 mg/kg over the 2nd hr, and 0.25 mg/kg over the 3rd hr for a total dose of 1.25 mg/kg (not to exceed 100 mg total).

Acute Ischemic Stroke

- IV (Adults): 0.9 mg/kg (not to exceed 90 mg), given as an infusion over 1 hr, with 10% of the dose given as a bolus over the 1st min.

Pulmonary Embolism

- IV (Adults): 100 mg over 2 hr; follow with heparin.

Occluded Venous Access Devices

- IV (Adults and Children): 2 mg/2 mL instilled into occluded catheter; if unsuccessful, may repeat once after 2 hr.
- IV (Adults and Children): 110% of the lumen volume (not to exceed 2 mg in 2 mL) instilled into occluded catheter; if unsuccessful, may repeat once after 2 hr.

NURSING IMPLICATIONS

Assessment

- Begin therapy as soon as possible after the onset of symptoms.
- Monitor vital signs, including temperature, continuously for myocardial infarction and at least every 1 hr during therapy for other indications. Do not use lower extremities to monitor BP. Notify health care professional if systolic BP \( \leq 180 \) mm Hg or diastolic BP \( \leq 110 \) mm Hg. Thrombolytic therapy should not be given if hypertension is uncontrolled. Inform health care professional if hypotension occurs. Hypotension may result from the drug, hemorrhage, or cardiogenic shock.
- Assess patient carefully for bleeding every 15 min during the 1st hr of therapy, every 15–30 min during the next 6 hr, and at least every 1 hr for the duration of therapy. Frank bleeding may occur from sites of invasive procedures or from body orifices. Internal bleeding may also occur (decreased neurologic status; abdominal pain with coffee-grounds emesis or black, tarry stools; hematuria; joint pain). If uncontrolled bleeding occurs, stop medication and notify health care professional immediately.
- Assess patient for hypersensitivity reaction (rash, dyspnea, fever, changes in facial color, swelling around the eyes, wheezing). If these occur, inform health care professional promptly. Keep epinephrine, an antihistamine, and resuscitation equipment close by in the event of an anaphylactic reaction.
- Assess neurologic status throughout therapy. Altered sensorium or neurologic changes may be indicative of intracranial bleeding.
- Myocardial Infarction: Monitor ECG continuously. Notify health care professional if significant arrhythmias occur. IV lidocaine or procainamide (Pronestyl) may be ordered prophylactically. Monitor cardiac enzymes. Brain death, neurological changes, and/or autopsy may be indicated 7–10 days after therapy to monitor effectiveness of therapy.
- Assess intensity, character, location, and radiation of chest pain. Note presence of associated symptoms (nausea, vomiting, diaphoresis). Administer analgesics as directed. Notify health care professional if chest pain is unrelieved or recurs.
- Monitor heart sounds and breath sounds frequently. Notify health care professional if signs of HF occur (rales/crackles, dyspnea, S3 heart sound, jugular venous distention, relieved CVP).
- Acute Ischemic Stroke: Assess neurologic status. Determine time of onset of stroke symptoms. Alteplase must be administered within 3–4.5 hr of onset (within 3 hrs in patients older than 80 years, those taking oral anticoagulants, those with a baseline National Institutes of Health Stroke Scale score \( \geq 25 \), or those with both a history of stroke and diabetes).
- Pulmonary Embolism: Monitor pulse, BP, hemodynamics, and respiratory status (rate, degree of dyspnea, \( \text{SpO}_2 \)).
- Deep Vein Thrombosis/Severe Arterial Occlusion: Observe extremities and palpate pulses of affected extremities every hour. Notify health care professional immediately.
**CONTDUED**

alteplase

Thrombolytic agents should be used only in settings in which hemostatic functions and clinical response can be adequately monitored.

Starting two IV lines before therapy is recommended; use for the thrombolytic agent, the other for any additional infusions.

Avoid invasive procedures, such as IM injections or arterial punctures, with this therapy. If such procedures must be performed, apply pressure to all arterial and venous puncture sites for at least 5 min. Avoid venipunctures at noncompressible sites (e.g., femoral, subclavian site).

**IV Administration**

**pH:** 7.3.

**Intermittent Infusion:** Vials are packaged with sterile water for injection (without preservatives) to be used as diluent. Do not use bacteriostatic water for infusion. Reconstitute 50-mg vials with 50 mL and 100-mg vials with 100 mL using an 18-gauge needle. Avoid excess agitation during dilution; small or strict pressure to mix. Solution may foam upon reconstitution. Bubbles will resolve upon standing a few min. Solution will be clear to pale yellow. Stable for 8 hr at room temperature.

**Concentration:** May be administered as reconstituted (1 mg/mL). **Diluent:** May be further diluted immediately before use in an equal amount of 0.9% NaCl or 0.9% Ringer’s solution. **Rate:** Flush line with 20–30 mL of saline to ensure entire dose is received. See Route and Dosage section for specific rates.

**Y-Site Compatibility:** hyaluronidase, lidocaine, metoprolol, propranolol.

**Y-Site Incompatibility:** heparin, thrombolytic agents, bivalirudin, dobutamine, dopamine, heparin, metoprolol, propranolol, tirofiban, epinephrine, ceftriaxone, cefazolin, cefuroxime, loratadine, ondansetron.

**Cathflo Activase:** Reconstitute by withdrawing 2.2 mL of sterile water (provided) and injecting into Cathflo Activase vial, directing diluent into powder for a concentration of 1 mg/mL. Allow slight foaming to dissipate by letting vial stand undisturbed. Do not use bacteriostatic water. Mix by gentle swirling to dissolve; complete dissolution should occur within 5 min. Do not shake. Solution should be colorless to pale yellow. Use solution within 8 hr.

**Rate:** Withdraw 2.2 mL of reconstituted solution and mix into excluded catheter. Allow 30 min dwell time, attempt to aspirate blood. If catheter remains occluded, allow 120 min dwell time. If catheter function is not restored after one dose, second dose may be modified. If catheter function is restored, aspirate 4–5 mL of blood in patients >10 kg or 3 mL in patients <10 kg to remove Cathflo Activase and residual clot. Gently irrigate catheter with 0.9% NaCl.

**Discontinued.**

**Potential Nursing Diagnoses**

- Risk for injury (Side Effects)

**Implementation**

**High Alert:** Therefore, and under dosage of thrombolytic medications have resulted in patient harm or death. Clarify orders that resulted in patient harm or death. Have second practitioner independently check orders that resulted in patient harm or death. Clarify orders that resulted in patient harm or death.

**High Alert:** High Alert: Risk for injury (Side Effects).

**Indications**

- Ineffective tissue perfusion (Indications)

**Lab Test Considerations**

- Hematocrit, hemoglobin, platelet count, fibrin/fibrin degradation product (FDP/fdp) titer, thrombin time, and activated partial thromboplastin time may be evaluated before and frequently during therapy. Bleeding time may be assessed before therapy.

- Potentially develop platelet aggregation inhibitors.

- Potential Nursing Diagnoses: Monitor ability to aspirate blood as indicator of patency. Ensure that patient exhales and holds breath when connecting and discontinuing IV设置 to prevent air embolism.

- Leave intubation and ventilation equipment available at all times in case of hemorhage.

- Stools should be tested for occult blood loss and urine for hematuria periodically during therapy.

- Toxicity and Overdose: High Alert: Risk for injury (Side Effects).

**CAUTION:**

Genetic Implication. CAPI TALS indicate life-threatening, underlines indicate most frequent. Strikethrough indicate discontinued.
Patient/Family Teaching

- Explain purpose of medication and the need for close monitoring to patient and family. Instruct patient to report hypersensitivity reactions (rash, dyspnea) and bleeding or bruising.
- Explain need for bedrest and minimal handling during therapy to avoid injury. Avoid all unnecessary procedures such as shaving and vigorous tooth brushing.

Evaluation/Desired Outcomes

- Lysis of thrombi and restoration of blood flow.
- Prevention of neurologic sequelae in acute ischemic stroke.
- Cannula or catheter patency.

Why was this drug prescribed for your patient?