Stroke Reperfusion Therapy: IV t-PA Treatment Phase

IV tPA Administration for Adult Patients Arriving Within 3 Hours.

Page Contents

- Consent Form
- Indications for IV tPA
- Contraindications
- Warnings
- t-PA Dosing
- Treatment Phase
  - ED Nurse Responsibilities
  - Neurologist Responsibilities
- Post Treatment Phase
  - ED Nurse Responsibilities
  - Neurologist Responsibilities
- tPA patient info sheet
- References
- Authoring Information

Comments in brackets denote activities specific to MGH, or additional commentary regarding national standards or guidelines. For example:

Activate the Stroke Team

[MGH Beeper 34282]

Prior to making any medical decisions, please view our disclaimer.

Consent Form

- IV consent form

Indications for IV tPA

- Age greater than or equal to 18 yrs
- A significant neurologic deficit expected to result in long term disability
- Non-contrast CT scan showing no hemorrhage or well-established new infarct
- Acute ischemic stroke symptoms with onset or last known well, clearly defined, less than 3 hours before t-PA will be given

Contraindications

These are based on FDA approved labeling of alteplase.

Contraindications include any of the following:

- SBP greater than 185 or DBP greater than 110 mmHg (see BP Management)
  
  [despite medical intervention to lower it]
- Seizure at onset
  
  [if residual deficits are due to the postictal state rather than to ischemia. If rapid diagnosis of vascular occlusion can be made, treatment may be given.]
- Recent surgery/trauma (less than 15 days)
- Recent intracranial or spinal surgery, head trauma, or stroke (less than 3 months)
- History of intracranial hemorrhage or brain aneurysm or vascular malformation or brain tumor
  
  [may consider iv tPA in patients with CNS lesions that have a very low likelihood of bleeding such as small
unruptured aneurysms or benign tumors with low vascularity

- Active internal bleeding (less than 22 days)
  - including arterial puncture at a non-compressible site
- Platelets less than 100,000, PTT greater than 40 sec after heparin use, or PT greater than 15 or INR greater than 1.7, or known bleeding diathesis
  - see protocol for starting tPA while awaiting results of PT/PTT
- Suspicion of subarachnoid hemorrhage
  - by imaging or clinical presentation
- CT findings (ICH, SAH, or major acute infarct signs)
  - e.g. hypodensity greater than 1/3 cerebral hemisphere

Warnings

These conditions may increase the risk of unfavorable outcomes but are not necessarily a contraindication to treatment:

- Stroke severity - too severe (e.g., NIHSS greater than 22)
  - At MGH, we typically do not exclude patients based on an increased NIHSS alone.
- Glucose less than 50 or greater than 400 mg/dl
  - If residual deficits are due to the altered metabolic state rather than to ischemia. If rapid diagnosis of vascular occlusion can be made, treatment may be given.
- Left heart thrombus documented
- Increased risk of bleeding due to any of the following:
  - Acute pericarditis
  - Subacute bacterial endocarditis (SBE)
  - Hemostatic defects including those secondary to severe hepatic or renal disease
  - Pregnancy
  - Diabetic hemorrhagic retinopathy, or other hemorrhagic ophthalmic conditions
  - Septic thrombophlebitis or occluded AV cannula at seriously infected site
  - Patients currently receiving oral anticoagulants, e.g., Warfarin sodium
    - and INR greater than 1.7
  - Advanced age
- Rapid improvement
- Stroke severity too mild
  - e.g. anticipate ability to discharge to home
- Life expectancy less than 1 year or severe co-morbid illness or CMO on admission

**t-PA Dosing**

Calculate the exact dose of t-PA using the [t-PA Dosing Calculator](http://www2.massgeneral.org/stopstroke/protocolThromIV.aspx) if patient's weight is known or measured. If estimating weight to 10 lb intervals, the Dosing Sheet below may be used.

<table>
<thead>
<tr>
<th>Estimated Weight (lbs)</th>
<th>Conversion to Kilograms (Kg)</th>
<th>Total iv t-PA Dose (mg) at 0.9 mg/kg</th>
<th>t-PA Bolus (mg) * 10% of total</th>
<th>t-PA Bolus (ml)</th>
<th>Discard Dose t-PA (Not for infusion)</th>
<th>Infusion Dose (mg)</th>
<th>Infusion Rate (ml/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>220+</td>
<td>100.0</td>
<td>90.0</td>
<td>9.0</td>
<td>9.0</td>
<td>10.0</td>
<td>81.0</td>
<td>81.0</td>
</tr>
<tr>
<td>210</td>
<td>95.5</td>
<td>85.9</td>
<td>8.6</td>
<td>8.6</td>
<td>14.1</td>
<td>77.3</td>
<td>77.3</td>
</tr>
<tr>
<td>200</td>
<td>90.9</td>
<td>81.8</td>
<td>8.2</td>
<td>8.2</td>
<td>18.2</td>
<td>73.6</td>
<td>73.6</td>
</tr>
<tr>
<td>190</td>
<td>86.4</td>
<td>77.7</td>
<td>7.8</td>
<td>7.8</td>
<td>22.3</td>
<td>70.0</td>
<td>70.0</td>
</tr>
<tr>
<td>180</td>
<td>81.8</td>
<td>73.6</td>
<td>7.4</td>
<td>7.4</td>
<td>26.4</td>
<td>66.3</td>
<td>66.3</td>
</tr>
<tr>
<td>170</td>
<td>77.3</td>
<td>69.5</td>
<td>7.0</td>
<td>7.0</td>
<td>30.5</td>
<td>62.6</td>
<td>62.6</td>
</tr>
<tr>
<td>160</td>
<td>72.7</td>
<td>65.5</td>
<td>6.5</td>
<td>6.5</td>
<td>34.5</td>
<td>58.9</td>
<td>58.9</td>
</tr>
<tr>
<td>150</td>
<td>68.2</td>
<td>61.4</td>
<td>6.1</td>
<td>6.1</td>
<td>38.6</td>
<td>55.2</td>
<td>55.2</td>
</tr>
<tr>
<td>140</td>
<td>63.6</td>
<td>57.3</td>
<td>5.7</td>
<td>5.7</td>
<td>42.7</td>
<td>51.5</td>
<td>51.5</td>
</tr>
<tr>
<td>130</td>
<td>59.1</td>
<td>53.2</td>
<td>5.3</td>
<td>5.3</td>
<td>46.8</td>
<td>47.9</td>
<td>47.9</td>
</tr>
<tr>
<td>120</td>
<td>54.5</td>
<td>49.1</td>
<td>4.9</td>
<td>4.9</td>
<td>50.9</td>
<td>44.2</td>
<td>44.2</td>
</tr>
<tr>
<td>110</td>
<td>50.0</td>
<td>45.0</td>
<td>4.5</td>
<td>4.5</td>
<td>55.0</td>
<td>40.5</td>
<td>40.5</td>
</tr>
<tr>
<td>100</td>
<td>45.5</td>
<td>40.9</td>
<td>4.1</td>
<td>4.1</td>
<td>59.1</td>
<td>36.8</td>
<td>36.8</td>
</tr>
</tbody>
</table>
Treatment Phase

ED Nurse Responsibilities:

- Mix and draw up tPA per protocol:
  - Provide physician with the 10% bolus dose, either in CT area or ED bay
  - Prepare the infusion
  - If tPA is mixed but patient does not receive drug, initiate rebate and restocking procedures
- Once infusion begins monitor vital signs as follows:
  - Every 15 min for 2 hours, then:
  - Every 30 minutes for 6 hours, then:
  - Every 60 minutes for 16 hours
- Notify physician immediately if SBP/DBP greater than 175/100
- Do not insert Foley catheter or nasogastric tube unless ordered
- Document hourly neurologic reassessment (more frequently if changes occur)

Neurologist Responsibilities (includes Resident, Fellow or Attending):

- Calculate IV tPA dose based on weight estimate and tPA dosing table:
  - Document estimated weight
  - Review with nursing staff to ensure accuracy
  - Confirm BP within safe limits
  - Write order for tPA total dose as a bolus plus infusion
  - Administer the 10% bolus over 1 minute and document time on ED medication order sheet
- Repeat NIHSS evaluation if patient exam has changed significantly
- Strict control of blood pressure for 24 hours per protocol
- Request an Acute Stroke admission bed to the CMF/ICU Service. The patient remains under the care of the Acute Stroke Team until officially transferred to the CMF/ICU Attending.
- Coordinate the post tPA care with the ED attending to ensure continuity until the patient can be transferred out of the ED
- Management of blood pressure (see BP Management)

Post Treatment Phase

ED Nurse Responsibilities

- Document neurologic assessment hourly or more frequently if changes occur
- Vital sign monitoring as described above under Treatment Phase
- Verify the patency of IV and completion of the tPA dose
- Provide nursing report to the accepting nurse
- Provide family/patient with appropriate resource materials about stroke

Neurologist Responsibilities (includes Resident, Fellow or Attending)

- ICU/Acute Stroke Unit admission for monitoring during first 24 hours
- Modify the standard POE order set for stroke post tPA as indicated
- Order routine non-contrast head CT at 24 hours post treatment (or STAT with any worsening in neurological status)
- Vital signs every 15 minutes for 2 hours, then every 30 minutes for 6 hours, then every 1 hour for 16 hours
- Strict control of blood pressure for 24 hours per protocol
- Restrict patient intake to strict NPO including meds until swallowing screen performed and passed
- Continuous pulse oximetry monitoring, order oxygen by nasal cannula or mask to maintain O2 sat greater than 95%
- Tylenol 650 mg po/pr every 4 hours prn T greater than 99.4; consider cooling for T greater than 102
- No antiplatelet agents or anticoagulants (including heparins for DVT prophylaxis) in first 24 hours
- No Foley catheter, nasogastric tube, arterial catheter or central venous catheter for 24 hr, unless absolutely necessary
- For any acute worsening of neurologic condition:
  - For suspected symptomatic hemorrhage after t-PA or other plasminogen activator has been given:
    - Hold administration of IV tPA if still infusing until Brain CT completed and shows no evidence of bleeding.
    - Exclude other possible causes of neurologic worsening or acute hemodynamic instability.
  - For confirmed symptomatic hemorrhage on Head CT
    - Consult Neurosurgery for possible intervention.
Check STAT labs: CBC, PT, PTT, platelets, fibrinogen and D-dimer.
- If fibrinogen less than 100 mg/dL, then give Cryoprecipitate 0.15 units/kg rounded to the nearest integer. If still bleeding at 1 hr and fibrinogen level still less than 100 mg/dL, repeat cryoprecipitate dose.
- Institute frequent neurochecks and therapy of acutely elevated ICP, as needed.
- Additional Options or considerations
  - If platelet dysfunction suspected, give platelets 4 units.
  - If heparin has been administered in the past 3 hours:
    - Discontinue the heparin infusion and order Protamine sulfate. Calculate total amount of heparin received over the preceding 3 hours.
    - If initiated within 30 minutes of last heparin dose: Give 1mg protamine per 100U heparin.
    - If initiated within 30-60 minutes: Give 0.5-0.75 mg protamine per 100U heparin.
    - If initiated within 60-120 minutes: Give 0.375-0.5mg protamine per 100U heparin.
    - If heparin stopped greater than 120 minutes ago: Give 0.25-0.375 mg protamine per 100U heparin.
    - Give by slow IV injection, not to exceed 5mg/min, with total dose not to exceed 50mg.
    - Monitor for signs of anaphylaxis; the risk is higher in diabetics who have received insulin.
    - Follow-up with STAT PTT q1 hour for the next 4 hours, then q4 hours through 12 hours of hospitalization.
- For uncontrolled, life-threatening bleeding, consider aminocaproic acid (Amicar) 10 g IV in 250 cc NS IV over 1 hr as a last resort. Note there is a significant risk of pathologic thrombosis with Amicar.
- Serious systemic hemorrhage should be treated in a similar manner. Manually compress and compressible sites of bleeding, and consult appropriate additional services to consider mechanically occluding arterial or venous sources of medically uncontrollable bleeding.
- Coordinate care with accepting CMF team resident

**tPA patient info sheet**

[View sheet](#) (PDF)

### References


### Authoring Information

Reviewed/Approved by: ASQT

Last updated: 5/1/2005