

**CVA PATHWAY -
TPA TREATMENT ORDERS
PHYSICIAN'S ORDERS**

ADDRESSOGRAPH

NAME

ROOM NO.

DR.

HOSP. NO.

ADM. DATE

CP024

DO NOT USE THE FOLLOWING ABBREVIATIONS/ACRONYMS/SYMBOLS

- | | |
|--|------------------------------|
| U (for unit) | Q.O.D. (for every other day) |
| IU (for international unit) | X.0 mg (trailing zero) |
| Q.D. (for once daily) | .X mg (lack of leading zero) |
| AU, AD, AS (each ear, right ear, left ear) | TIW (three times a week) |
| ZnSO ₄ (zinc sulfate) | |
| MS, MSO ₄ , MgSO ₄ (for morphine sulfate or magnesium sulfate) | |

REMINDER: PLEASE INCLUDE INDICATIONS WHEN ORDERING DIAGNOSTIC TESTS

DATE / TIME	ORDER NO.	ENTERED BY	ORDER						
			CVA PATHWAY - TPA TREATMENT ORDERS <u>Confirm following prior to administration of TPA for stroke:</u> <input type="checkbox"/> TPA exclusion list completed (page 3) <input type="checkbox"/> Activate stroke team <input type="checkbox"/> Time of onset of stroke symptoms _____ <input type="checkbox"/> NIHSS score _____ <input type="checkbox"/> Secure two IV lines <input type="checkbox"/> EKG and CXR results available <input type="checkbox"/> If Foley catheter needed insert prior to TPA <input type="checkbox"/> Allergy _____ <input type="checkbox"/> CT or MRI demonstrates no intracranial hemorrhage <input type="checkbox"/> Patient's weight _____ (kg) <input type="checkbox"/> Time of administration of TPA _____ <u>TPA administration</u> Total dose of TPA to be administered _____ mg (0.9 mg/kg; ≤ 90 mg) <input type="checkbox"/> Give _____ mg of TPA as an IV bolus over 1 min (10% of total dose) <input type="checkbox"/> Give remaining _____ mg of TPA over 60 min (remaining 90% of total dose) During TPA administration, if suspicion of intracranial hemorrhage (neurological deterioration, new headache, sudden elevated blood pressure, nausea, vomiting), alert MD, discontinue TPA, and obtain stat CT scan. <u>Precautions during and following TPA administration.</u> <ul style="list-style-type: none"> • Maintain BP < 185 mm Hg systolic and < 105 mm Hg diastolic • Neuro checks (LOC, arm and leg weakness), BP, HR, RR every 15 min for 2 hours • Continuous cardiac monitoring • <u>No aspirin, heparin, Coumadin, or any anticoagulant for 24 hours</u> • Avoid excessive IV sticks, IM injections or arterial lines for 48 hours • Call MD immediately for evidence of bleeding, neurological deterioration, or vital signs outside the following ranges: <ul style="list-style-type: none"> > Systolic BP > 185 or < 110 > Diastolic BP > 105 or < 60 > Pulse < 50 > Respirations > 24 > Temp > 101° F > Decline in neurological status or worsening of stroke signs. > Signs of allergy to TPA (angioedema (hives), headache, SOB) 						
			<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:33%;">TIME</td> <td style="width:33%;">DATE</td> <td style="width:33%;">SIGNATURE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	TIME	DATE	SIGNATURE			
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***** DRUG SENSITIVITY (SPECIFY DRUGS) *****

DISPENSED IN ACCORD WITH THE HOSPITAL FORMULARY SYSTEM. If not desirous of the exact equivalent, draw a line through the permissive statement and indicate drug.

DRUGS — NO SUBSTITUTIONS:	ORDERS ENTERED BY			
	INIT	SIGNATURE	INIT	SIGNATURE

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			<p align="center">CVA PATHWAY - TPA TREATMENT ORDERS</p> <p><input type="checkbox"/> Admit to ICU</p> <p>Consults • Neurology <input type="checkbox"/> PT <input type="checkbox"/> OT <input type="checkbox"/> ST • Swallow evaluation • Speech Evaluation • May do FEE's if indicated</p> <p>Code Status: <input type="checkbox"/> Code A <input type="checkbox"/> Code B (see code sheet)</p> <p><input type="checkbox"/> IV orders: _____</p> <ul style="list-style-type: none"> • I & O per shift • Neuro checks (LOC, arm and leg weakness) and vital signs (BP, HR, RR) every 15 min for 2 hrs after TPA infusion, then every 30 minutes for 6 hrs, then every 1 hour for 24 hrs • Notify physician for SBP > 185 or DBP > 105 • Notify physician for headache, nausea/vomiting, mental status change, acute change in blood pressure • NPO until swallow evaluation completed • Glucose FS every 4 hours. Call MD if > 150 • DVT stockings • HOB to be elevated 30 degrees • Elevate head of bed to 90 degrees during meals (unless contraindicated) • Avoid arterial punctures, frequent venous punctures and urinary catheterization for 24 hrs <p>Diagnostic <input type="checkbox"/> CT scan brain (non contrast) 24 hrs after TPA</p> <p>Imaging <input type="checkbox"/> Carotid Doppler</p> <p><input type="checkbox"/> MRI/MRA (complete requisition forms)</p> <p><input type="checkbox"/> Transthoracic echo - indication: _____</p> <p><input type="checkbox"/> Transesophageal echo - indication: _____</p> <p>(complete TEE requisition form; keep patient npo after midnight before exam)</p> <p><input type="checkbox"/> Other _____</p> <p>Laboratory • Hgb and Hct every 6 hrs x 2, PT/PTT every 6 hrs x 2</p> <p>Tests • AM labs: fasting lipid panel, CBC, BMP, PT/INR, PTT, Hepatic Panel, HgbA1c</p> <ul style="list-style-type: none"> • Stool for occult blood <p><input type="checkbox"/> Holter <input type="checkbox"/> EEG <input type="checkbox"/> Other _____</p> <p>Medications <input type="checkbox"/> Oxygen per nasal cannula at _____ L (if O₂ sat < 90% call MD)</p> <p><input type="checkbox"/> Acetaminophen 650 mg every 4 hrs po/pr prn for temp > 100</p> <p><input type="checkbox"/> Colace 100 mg po daily <input type="checkbox"/> Senokot 1 po every hs (hold for loose stools)</p> <p><input type="checkbox"/> Pepcid 20 mg po daily or <input type="checkbox"/> Protonix 40 mg po daily</p> <p><input type="checkbox"/> Simvastatin 10 mg po every hs (titrate based on lipid profile result)</p> <p><input type="checkbox"/> Novolog Insulin SC pr sliding scale:</p> <p>Blood glucose 150-200 administer 2 units Blood glucose 301-350 administer 8 units</p> <p>Blood glucose 201-250 administer 4 units Blood glucose 351-400 administer 10 units</p> <p>Blood glucose 251-300 administer 6 units Blood glucose <60 or >400 please notify MD</p>						
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**INTRAVENOUS TPA ADMINISTRATION INCLUSION/
EXCLUSION CRITERIA FOR ISCHEMIC STROKE**

This inclusion/exclusion criteria provides a tool to be used in the assessment of a patient in the acute setting. Final decision to use TPA is at the discretion of the treating physician.

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Patient Inclusion Criteria

- Yes _____ 1. Age 18 years or older.
- Yes _____ 2. Clinical Diagnosis of Ischemic Stroke.
- Yes _____ 3. Measurable neurological deficit.
- Yes _____ 4. Clearly defined time of stroke onset (within 180 minutes of stroke onset).
- Yes _____ 5. Baseline CT scan showing no evidence of intracranial hemorrhage or mass.
- Yes _____ 6. Neurology consultation.
- Yes _____ 7. Informed consent (if possible).

Patient Exclusion Criteria

- No _____ 1. Rapidly improving or minor symptoms.
- No _____ 2. CT scan showing evidence of intracranial hemorrhage.
- No _____ 3. Stroke or serious head trauma during preceding 3 months.
- No _____ 4. Prior history of intracranial hemorrhage that could increase the risk of intracranial hemorrhage.
- No _____ 5. Major surgery or other serious trauma during preceding 2 weeks.
- No _____ 6. GI or urinary tract hemorrhage during preceding 3 weeks. (Stool Guaiac +)
- No _____ 7. SBP >185 mm of Hg or DBP > 110 mm of Hg at the time of TPA infusion.
- No _____ 8. Myocardial infarction within 3 months.
- No _____ 9. Aggressive treatment to lower BP.
- No _____ 10. Symptoms of subarachnoid hemorrhage.
- No _____ 11. Arterial puncture at noncompressible site or LP during preceding 1 week.
- No _____ 12. Platelet count < 100,000/mm³. (TPA can be started before CBC results received, but should be discontinued if platelet count is <100,000/mm³)
- No _____ 13. Heparin during the preceding 48 hours associated with elevated PTT.
- No _____ 14. Clinical presentation suggesting pericarditis or myocardial infarction.
- No _____ 15. Pregnant female or lactating.
- No _____ 16. Currently taking oral anticoagulants with INR > 1.5.
- No _____ 17. Aortic Dissection

Relative Contraindications

- 1. Early signs of large cerebral infarction: edema, hypodensity, mass effect and obliteration of sulci in more than 1/3 of middle cerebral artery territory on CT Scan.
- 2. NIHSS >22.
- 3. Difficult to control hypertension.
- 4. History of seizure at stroke onset.
- 5. History of AVM or aneurysm.
- 6. Glucose < 50 or > 400
- 7. Carotid/Vertebral artery dissection

Decision to treat with TPA _____ Yes _____ No

Reason: _____

Signature: _____ Date/Time: _____

INTRACRANIAL HEMORRHAGE FOLLOWING T-PA

Note: Administration of blood products will be at the discretion of the attending neurologist.

Purpose: Intracranial hemorrhage is a potential complication following intravenous thrombolysis. Although the half-life of t-PA is less than one hour, the natural progression of intracranial hemorrhage during or within hours after t-PA administration is not known. Therefore, patients should be closely monitored for any change in neurological status. Stroke symptoms may fluctuate in the acute presentation, and any worsening in consciousness or symptoms consistent with an intracerebral hemorrhage requires discontinuation of t-PA, a neurological assessment and an immediate head CT scan. These patients should have blood products administered unless otherwise contraindicated. Additionally, if a patient has remained stable following thrombolysis and a follow-up (usually 24 hours) head CT scan reveals intracranial hemorrhage, if repeat laboratory studies indicate an abnormal PT/PTT, a low fibrinogen, or if a patient may have received aspirin or other antiplatelet agents within the past two weeks, the attending neurologist should strongly consider administering blood products based on a clinical assessment as well as the size and location of the hemorrhage. The following protocol should be used for all acute ischemic stroke patients who have received t-PA following a complete laboratory stroke work-up including hematology (CBC with platelets), coagulation (PT/PTT), chemistry studies (electrolytes, CK, troponin I) and a Blood Bank specimen (clot).

Neurologic scales that suggest intracranial hemorrhage include:

- Worsening NIHSS score
- Worsening glasgow coma scale

Neurologic symptoms that suggest intracranial hemorrhage include:

- Decreased consciousness
- Sudden severe headache
- Nausea, vomiting
- Seizure
- Sudden elevated blood pressure

Procedure: if intracranial hemorrhage is presumed:

- Immediately discontinue t-PA infusion
- Reassess the patient's neurological status — perform and document NIHSS
- Perform stat blood draw — type and screen to Blood Bank
- Obtain an immediate stat head CT scan

Immediately, upon documentation of intracranial hemorrhage by CT scan (preliminary read acceptable):

- Call Blood Bank 709-6060
- Order 10 units (volume approximately 50 ml) of cryoprecipitate.
- If patient received an antiplatelet agent during the prior two weeks, or if antiplatelet use during that interval is unknown, also order 8 - 10 units of platelets (volume approximately 400 - 600 ml).
- Consider pre-medication 30 mins prior to transfusion (acetaminophen 650 mg PO (PR if NPO) and/or diphenhydramine 25 mg IV).
- Cryoprecipitate will be administered IV (using a 22 gauge or larger) over 15 mins.
- Platelets will be administered IV (using a 22 gauge or larger) over 30 - 60 mins.
- If the patient exhibits signs of a transfusion reaction, immediately stop platelet administration.
- Consider Neurosurgery consultation (203) 573-1423
- Consider Hematology consultation
- Discuss medical versus surgical therapy
- Repeat lab draw of PT/PTT/fibrinogen after administration of cryoprecipitate
- Evaluate PT/PTT/fibrinogen results; if after the administration of cryoprecipitate the PT/PTT is elevated consult Hematology for further recommendations
- If fibrinogen level is < 150 mg/dl, order and administer an additional 10 units of cryoprecipitate
- Consider serial CT scans to assess size and change of hemorrhage
- Follow serial NIHSS scores and vital signs as ordered by Neurology team

References:

1. Personal communication and recommendations made by Dr. Edward Snyder and Dr. Peter Marks in the Department of Laboratory Medicine, Yale University School of Medicine and Yale-New Haven Hospital; August, 2006.
2. Colman, RW, Marder, VJ, Clowes, AW et al, Ed. Hemostasis and Thrombosis; Basic Principles and Clinical Practice Fifth Edition. Lippincott Williams and Wilkins: Philadelphia. pp 1103-1119
3. The NINDS t-PA Stroke Study Group (1997). Intracerebral hemorrhage after intravenous t-PA therapy for ischemic stroke. Stroke 28(11) 2109-2118

Original: July 2006

Reviewed and approved by Dept of Laboratory Medicine and YNH Blood Bank August, 2006

Adapted with permission from YNH Stroke Team

- **BLOOD PRESSURE MANAGEMENT** Suggested Guidelines
Target BP will vary with type of stroke; target BP may be lowered with hypertensive encephalopathy, acute myocardial infarction, aortic dissection, acute renal failure or hemorrhagic transformation of ischemic stroke.
- **ISCHEMIC STROKE TREATED WITH THROMBOLYSIS**
BP must be < 185/110 prior to treatment with t-PA and be maintained at <180/105 for 24 hours post t-PA therapy (translates to a mean arterial blood pressure of 130, 2 x diastolic + systolic divided by 3). Suggested protocols for managing BP are summarized:
 - Labetolol 10-40 mg IV bolus over 1-2 min. Repeat for two to three doses to target BP. Total dose not to exceed 100 mg in one period of treatment or 300 mg per day. Caution: asthma, COPD, left ventricular failure, second or third degree heart block, heart rate <50.
 - Nicardipine drip 5 mg/h IV infusion. Increase by 2.5 mg/h every 5 min. to a max of 15 mg/h to achieve target BP. Caution: LV failure, aortic stenosis, cardiac ischemia.
 - Nitroprusside 0.25-10 mcg/kg/min. This is not recommended unless control cannot be achieved with other agents or the level of hypertension is extreme. Caution: elevated ICP, coronary artery disease, renal insufficiency.
 - Enalapril 0.625-1.2 mg IV every 6 hr. Caution: acute MI, history of angioedema, renal insufficiency.

In event of hypotension, a target MAP of 120-130 can be achieved with fluid boluses and titrating a neosynephrine drip at 0.5-3 mcg/kg/min (cautions: CHF, CAD, renal insufficiency).
- **ISCHEMIC STROKE NOT TREATED WITH THROMBOLYSIS**
In the first 24 hours after acute stroke, hypertension should not be treated unless SBP >220, DBP 121-140 or MAP >130 on two consecutive readings at least 5 minutes apart.
Treatment should be initiated with labetalol 10-20 mg IV over 1-2 minutes or nicardipine 5 mg/h infusion as initial dose, titrated to the target BP by increasing 2.5 mg/h every 15 minutes to a maximum of 15 mg/h.
Patients with SBP >220 and DBP >140 should receive sodium nitroprusside 0.25-10 µg/kg/min via arterial line even though it may aggravate or produce increased intracranial pressure (ICP). In most cases, BP will spontaneously decrease over the first 24 hours and a gradual decrease of 15% is desirable. BP can then be gradually lowered to a normal range when the perfusion deficit has cleared. This can be assessed with a perfusion scan or assumed to be the case in 5 days.
- **INTRACEREBRAL HEMORRHAGE**
American Stroke Association Guidelines recommend that BP be maintained below a MAP of 130 (180/105). If an ICP monitor is in place, BP should be titrated to maintain cerebral perfusion >70 mmHg. If surgical evacuation occurs, MAP of > 110 should be avoided in the immediate postoperative period. If systolic pressure falls to <90, neosynephrine or dopamine drip should be instituted. The goal is to minimize hematoma enlargement. Some centers set a target MAP of < 120.
- **SUBARACHNOID HEMORRHAGE (SAH)**
BP management after SAH is complex because of the need to balance the risk of rebleeding with the next to maintain perfusion pressure in infarcted brain. In all cases, avoid SBP <100 for 21 days. Before repair of the aneurysm, SBP should be ≤160. Should symptomatic vasospasm occur, some evidence would support increasing SBP to a maximum of 200-220. The specific target BP and optimal agents for treatment after SAH vary between centers and clinicians. Some experts advocate not treating until MAP is > 130, while others aggressively maintain SBP at <140 to 160 mmHg.
- **GLUCOSE CONTROL**
Hyperglycemia predicts a worse outcome for stroke victims. The Ischemic Stroke Pathway developed by NINDS recommends a range of 70-120 mg/dl.
Hyperglycemia may be an indication of previously undiagnosed diabetes, but may also occur as a stress response. HbA1C should be checked in patients with hyperglycemia.
- **MANAGEMENT OF GLUCOSE**
Normal saline instead of D5W1/2 NS should be used for intravenous (IV) fluid replacement unless there is a medical contraindication.
If the initial glucose level is >150 mg/dl initiate insulin sliding scale and set a target glucose range (i.e. 80-110 mg/dl or 70-120 mg/dl)