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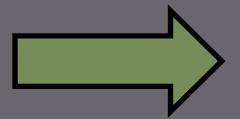
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1. A 72-yr-old male collapsed while shopping in the mall. He was not moving his left side and had difficulty in talking. He was found to have an acute ischemic stroke in the right MCA distribution. He received tPa in the ED and brought to the Neuro-Angiography Suite for thrombolysis with tPa.

Right MCA thrombolysis will help restore flow in

- A. [Central ischemic core](#)
- B. [Penumbra](#)
- C. [Right carotid artery](#)
- D. [Basilar artery](#)



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A. Central ischemic core

The central ischemic core is an area of severe hypo perfusion resulting in irreversible cell death. It represents the area already ischemic and not amenable to further treatment.

Moustafa RR, Baron JC. Br J Pharmacol. 2008;153(Suppl 1):S44-54



Wrong
answer

[Try Again](#)

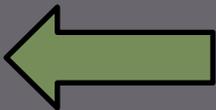
B. Penumbra



Correct answer

A sudden interruption of cerebral blood flow in the distribution of the right middle cerebral artery (MCA) produces a gradient of hypo perfusion characterized by an ischemic core surrounded by zones of penumbra and oligemia. The penumbra and oligemic zones represent potentially salvageable tissue and therapeutic targets for thrombolysis.

Fisher M, Garcia JH. Neurology 1996;47(4): 884-8.



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C. Right carotid artery

The right carotid artery may have athermanous plaques and may be the cause of acute ischemic stroke. To prevent further shower of emboli, neuroradiologists may insert carotid artery stents.



Wrong
answer

[Try Again](#)

D. Basilar artery

The basilar artery is part of the posterior circulation and formed by the 2 vertebral arteries. A basilar artery stroke will not present with hemiparesis.



Wrong
answer

[Try Again](#)

2. A 65-yr-old female patient, who was diagnosed with acute ischemic stroke 5 hours ago, is receiving intra-arterial tPa for thrombolysis under local anesthesia plus mild sedation. The patient's mental status suddenly worsens. Possible etiologies include all of the following **EXCEPT**

- A. Hemorrhagic transformation
- B. Hyperglycemia
- C. Post ictal state
- D. Hypotension

[Go to Q3](#)



A. Hemorrhagic transformation

Sudden changes in mental status in a patient receiving local anesthesia plus sedation may indicate hemorrhagic transformation of acute ischemic stroke. Auto regulation is impaired in cerebral ischemia and is one of the risk factors of hemorrhagic transformation. Use of tPa, anti- coagulation, increased time of onset since symptoms and large area of infarct may also lead to hemorrhagic transformation.

Wrong
answer

[Try Again](#)

B. Hyperglycemia

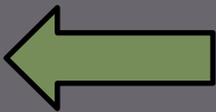


Correct Answer

Hyperglycemia will typically not cause sudden mental changes as seen in this case. Patients with Type II DM may develop focal or global neurological deficits with hyperosmolar states when the blood sugar is extremely high (often more than 600 mg/dl.)

Pasquel FJ, Umpierrez GE. Diabetes Care. 2014

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C. Post ictal state

Seizures may occur during the procedure from cerebral ischemia. The seizures may be sub-clinical and lead to a post ictal state which presents as drowsiness and sudden change in mental status



Wrong
Answer

[Try Again](#)

D. Hypotension

Recent retrospective studies have examined the association between type of anesthesia and outcomes after acute ischemic stroke. GA and increased sedation led to poor functional outcome and increased mortality. Hypotension may increase the central ischemic core by reducing collateral flow to penumbra, cerebral edema and worsening of mental status.

Abou-Chebl A, et al. Stroke 2010;41(6):1175-9.

Wrong
Answer

[Try Again](#)

3. In a patient presenting with acute ischemic stroke, the following factors may cause secondary neurological injury **EXCEPT**

- A. [Hyperglycemia](#)
- B. [Hypoxia](#)
- C. [Hypothermia](#)
- D. [Hypotension](#)

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A. Hyperglycemia

Hyperglycemia is associated with worse functional outcome in patients with acute ischemic stroke. However it is unclear whether hyperglycemia is in itself detrimental or merely a marker for stroke severity. Secondary neurologic injury should be avoided in patients with acute ischemic stroke.

Baird TA, et al. Stroke 2003;34(9):2208-14

Wrong
Answer

[Try Again](#)

B. Hypoxia

Hypoxia should be avoided in all patients with suspected or confirmed stroke and Supplemental oxygen provided if required to maintain oxygen saturation to greater than 92%.

Davis MJ, et al. Anesthesiology 2012;116(2):396–405

Wrong
Answer

[Try Again](#)

C. Hypothermia

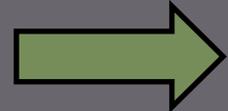


Hypothermia has been investigated extensively as a potential neuroprotectant. While animal studies have consistently demonstrated the benefits of therapeutic hypothermia in minimizing brain infarction in experimental models, these effects have not translated into clinical practice.

Kollmar R, Schwab S. J Neurotrauma 2009;26(3):377-86



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D. Hypotension

Hypotension can increase infarct size by reducing collateral flow to the penumbra.

Society for Neuroscience in Anesthesiology and Critical Care Expert Consensus Statement: Anesthetic Management of Endovascular Treatment for Acute Ischemic Stroke: Endorsed by the Society of NeuroInterventional Surgery and the Neurocritical Care Society. Journal of Neurosurgical Anesthesiology, 2014.*

Wrong
answer

[Try Again](#)

4. An 80-yr-old male was brought by ambulance with symptoms suggestive of acute ischemic stroke. He is awake. His BP is 190/110 mmHg. Rest of his vital signs are normal. His medical problems include hypertension, diabetes, peripheral vascular disease, CAD, atrial fibrillation and smoking (40 pack years). The following diagnostic studies must be done urgently **EXCEPT**

- A. [Non contrast CT scan](#)
- B. [12 lead EKG](#)
- C. [Chest X ray](#)
- D. [Blood glucose](#)



[Go to Q5](#)

A. Non contrast CT Scan

A non contrast CT Scan must be done to rule out hemorrhagic infarct which is a contraindication to revascularization therapy.

Wrong
Answer

[Try Again](#)

B. 12 lead EKG

12 lead electrocardiogram should be done to rule out myocardial ischemia and arrhythmia. Many patients presenting with acute ischemic stroke have similar risk factors to coronary artery disease including hypertension, diabetes, smoking and peripheral vascular disease.



Wrong
Answer

[Try Again](#)

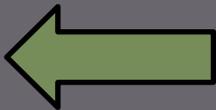
C. Chest X Ray



A chest radiograph is no longer routinely recommended unless aspiration or neurogenic pulmonary edema is suspected. In this case except hypertension, his vital signs are normal and do not suggest aspiration or pulmonary edema

Adams HP Jr, et al. Stroke 2007;38(5): 1655-711

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[Go to Q5](#)



D. Blood glucose

- Hypoglycemia must be ruled out in ALL patients presenting with symptoms suggestive of acute ischemic stroke.

Wrong
answer

[Try Again](#)

5. A 65-year-old female woman was brought urgently to the Neuroangiography Suite for urgent thrombolytic therapy with intracerebral tPa of basilar artery stroke. She was deemed a candidate for IV tPa since her symptoms occurred more than 5 hours ago. Her BP was noted to be 180/105 mm Hg. The BP should be

- A. Increased to 220/120 mmHg
- B. Decreased to baseline
- C. Monitored with invasive arterial blood pressure
- D. No change in BP until thrombolysis successful

[Go to Q 1](#)



A. BP should be increased to 220/120 mmHg

The most recent (2007 American Heart Association/ American Stroke Association) guidelines affirm that in most cases it is not imperative to lower blood pressure in the acute setting . The American Stroke Association guidelines recommend that antihypertensive agents should be withheld unless the systolic blood pressure is greater than 220 mm Hg or the diastolic blood pressure is greater than 120 mm Hg.

Wrong
Answer

[Try Again](#)

B. Decreased to baseline

In a patient with acute ischemic stroke, lowering the blood pressure can be detrimental as it reduces collateral flow to the penumbra.

Castillo J, et al. Stroke 2004;35(2):520–6.



[Try Again](#)

C. Monitored with invasive arterial blood pressure

The blood pressure can be monitored invasively with an arterial line if time permits. However given the urgency of the situation and TIME IS BRAIN concept, thrombolysis must proceed without any delay. The BP can be monitored using the side arm of the sheath inserted by the neuroradiologist and will predict the mean arterial blood pressure more accurately compared to systolic or diastolic blood pressure.

Gomez C. J Stroke Cerebrovasc Dis. 1993; 1-2

Wrong
Answer

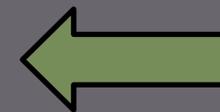
[Try Again](#)

D. No change in BP until thrombolysis successful



The American Stroke Association guidelines advocate that If patients have received thrombolytic therapy, maintaining systolic blood pressure less than or equal to 180 mm Hg and diastolic blood pressure less than or equal to 105 mm Hg until recanalization

Adams HP Jr, et al. Stroke 2007;38(5):1655-711



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