2018 Stroke Guidelines

2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke

Stroke.

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CLASS (STRENGTH) OF RECOMMENDATION

CLASS I (STRONG) — Benefit >>> Risk

Suggested phrases for writing recommendations:
- Is recommended
- Is indicated/useful/effective/beneficial
- Should be performed/administered/other
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is recommended/indicated in preference to treatment B
  - Treatment A should be chosen over treatment B

CLASS IIa (MODERATE) — Benefit >> Risk

Suggested phrases for writing recommendations:
- Is reasonable
- Can be useful/effective/beneficial
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is probably recommended/indicated in preference to treatment B
  - It is reasonable to choose treatment A over treatment B

CLASS IIb (WEAK) — Benefit ≥ Risk

Suggested phrases for writing recommendations:
- May/might be reasonable
- May/might be considered
- Usefulness/effectiveness is unknown/unclear/uncertain or not well established

CLASS III: No Benefit (MODERATE) — Benefit = Risk
(Generally, LOE A or B use only)

Suggested phrases for writing recommendations:
- Is not recommended
- Is not indicated/useful/effective/beneficial
- Should not be performed/administered/other

CLASS III: Harm (STRONG) — Risk > Benefit

Suggested phrases for writing recommendations:
- Potentially harmful
- Causes harm
- Associated with excess morbidity/mortality
- Should not be performed/administered/other

LEVEL (QUALITY) OF EVIDENCE‡

LEVEL A
- High-quality evidence‡ from more than 1 RCT
- Meta-analyses of high-quality RCTs
- One or more RCTs corroborated by high-quality registry studies

LEVEL B-R (Randomized)
- Moderate-quality evidence‡ from 1 or more RCTs
- Meta-analyses of moderate-quality RCTs

LEVEL B-NR (Nonrandomized)
- Moderate-quality evidence‡ from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies
- Meta-analyses of such studies

LEVEL C-LD (Limited Data)
- Randomized or nonrandomized observational or registry studies with limitations of design or execution
- Meta-analyses of such studies
- Physiological or mechanistic studies in human subjects

LEVEL C-EO (Expert Opinion)

Consensus of expert opinion based on clinical experience

COR and LOE are determined independently (any COR may be paired with any LOE).

A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

* The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).

† For comparative-effectiveness recommendations (COR I and IIa; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

‡ The method of assessing quality is evolving, including the application of standardized, widely used, and preferably validated evidence grading tools; and for systematic reviews, the incorporation of an Evidence Review Committee.

COR indicates Class of Recommendation; EO, expert opinion; LD, limited data; LOE, Level of Evidence; NR, nonrandomized; R, randomized; and RCT, randomized controlled trial.

PREHOSPITAL STROKE MANAGEMENT AND SYSTEMS OF CARE

EMS Assessment and Management

EMS personnel should provide prehospital notification to the receiving hospital that a suspected stroke patient is en route so that the appropriate hospital resources may be mobilized before patient arrival. (Class I; LOE B-NR)

EMS Systems

Patients with a positive stroke screen and/or a strong suspicion of stroke should be transported rapidly to the closest healthcare facilities that can capably administer IV alteplase. (Class I; LOE B-NR)

Hospital Stroke Teams

It is recommended that door-to-needle (DTN) time goals be established. A primary goal of achieving **DTN times within 60 minutes in ≥50%** of AIS patients treated with IV alteplase should be established. (Class I; LOE B-NR)

Hospital Stroke Teams

It may be reasonable to establish a secondary DTN time goal of achieving DTN times within 45 minutes in ≥50% of patients with AIS who were treated with IV alteplase. (Class IIb; LOE C-EO)

Organization and Integration of Components

It may be useful for **primary stroke centers** and other healthcare facilities that provide initial emergency care, including administration of **IV alteplase**, to develop the capability of performing emergency non-invasive intracranial vascular **imaging** to most appropriately select patients for **transfer** for endovascular therapy (EVT) and to reduce the time to EVT. (Class IIb; LOE C-LD)

Organization and Integration of Components

Mechanical thrombectomy requires the patient to be at an experienced stroke center with rapid access to cerebral angiography, qualified neuro-interventionalists, and a comprehensive periprocedural care team.

Systems should be designed, executed, and monitored to emphasize expeditious assessment and treatment.

Outcomes for all patients should be tracked.

Facilities are encouraged to define criteria that can be used to credential individuals who can perform safe and timely intra-arterial revascularization procedures. (Class I; LOE C-EO)

EMERGENCY EVALUATION AND TREATMENT

Brain Imaging

All patients admitted to hospital with suspected acute stroke should receive brain imaging evaluation on arrival to hospital. In most cases, **non-contrast CT** will provide the necessary information to make decisions about acute management. (Class I; LOE B-NR)

Brain Imaging

Systems should be established so that brain imaging studies can be performed **within 20 minutes** of arrival in the ED in at **least 50% of patients** who may be candidates for IV alteplase and/or mechanical thrombectomy. (Class I; LOE B-NR)

Brain Imaging

There remains insufficient evidence to identify a threshold of acute CT hypo-attenuation severity or extent that affects treatment response to IV alteplase.

The extent and severity of acute hypo-attenuation or early ischemic changes should not be used as a criterion to withhold therapy for such patients who otherwise qualify. (Class III: No benefit; LOE B-R)

Brain Imaging

For patients who otherwise meet criteria for **EVT**, a noninvasive intracranial vascular study is recommended during the initial imaging evaluation of the acute stroke patient, but **should not delay IV alteplase** if indicated. For patients who qualify for IV alteplase according to guidelines from professional medical societies, **initiating IV alteplase before noninvasive vascular imaging** is recommended for patients who have not had noninvasive vascular imaging as part of their initial imaging assessment for stroke. Noninvasive intracranial vascular imaging should then be obtained as quickly as possible. (Class I; LOE A)

Brain Imaging

For patients who otherwise meet criteria for EVT, it is reasonable to proceed with CTA if indicated in patients with suspected intracranial large vessel occlusion (LVO) before obtaining a serum **creatinine** concentration in patients without a history of renal impairment. (Class IIa; LOE B-NR)

Brain Imaging

In patients who are potential candidates for mechanical thrombectomy, imaging of the extracranial carotid and vertebral arteries, in addition to the intracranial circulation, is reasonable to provide useful information on patient eligibility and endovascular procedural planning. (Class IIa; LOE C-EO)

Brain Imaging

In selected patients with AIS within **6 to 24 hours** of last known normal who have LVO in the anterior circulation, obtaining **CTP, DW-MRI, or MRI perfusion** is recommended to aid in patient selection for **mechanical thrombectomy**, but only when imaging and other eligibility criteria from RCTs showing benefit are being strictly applied in selecting patients for mechanical thrombectomy. (Class I; LOE A)

Other Diagnostic Tests

Only the assessment of **blood glucose** must precede the initiation of IV alteplase in all patients. (Class I; LOE B-R)

Other Diagnostic Tests

Baseline **ECG** assessment is recommended in patients presenting with AIS, but should not delay initiation of IV alteplase. (Class I; LOE B-NR)

Other Diagnostic Tests

Baseline **troponin** assessment is recommended in patients presenting with AIS, but should not delay initiation of IV alteplase. (Class I; LOE B-NR)

Other Diagnostic Tests

Usefulness of **CXR** in the hyper-acute stroke setting in the absence of evidence of acute pulmonary, cardiac, or pulmonary vascular disease is unclear.

If obtained, they should not unnecessarily delay administration of IV alteplase. (Class IIb; LOE B-NR)

GENERAL SUPPORTIVE CARE AND EMERGENCY TREATMENT

Airway, Breathing, and Oxygenation

Airway support and ventilatory assistance are recommended for the treatment of patients with acute stroke who have decreased consciousness or who have bulbar dysfunction that causes compromise of the airway. (Class I; LOE C-EO)

Airway, Breathing, and Oxygenation

Supplemental oxygen should be provided to maintain oxygen saturation **>94%.** (Class I; LOE C-LD)

Blood Pressure

Hypotension and hypovolemia should be corrected to maintain systemic perfusion levels necessary to support organ function. (Class I; LOE C-EO)

Blood Pressure

In patients with **BP ≥220/120 mmHg** who did **not receive IV alteplase or EVT** and have no comorbid conditions requiring acute antihypertensive treatment, the benefit of initiating or reinitiating treatment of hypertension within the first 48 to 72 hours is uncertain. It might be reasonable to lower BP by 15% during the first 24 hours after onset of stroke. (Class IIb; LOE C-EO)

Blood Pressure

Patients who have elevated BP and are otherwise eligible for treatment with IV alteplase should have their BP carefully lowered so that their **BP is <185/110 mmHg before IV fibrinolytic therapy** is initiated. (Class I; LOE B-NR)

Blood Glucose

Evidence indicates that persistent in-hospital hyperglycemia during the first 24 hours after AIS is associated with worse outcomes than normo-glycemia and thus, it is reasonable to treat hyperglycemia to achieve **blood glucose levels in a range of 140 to 180 mg/dL** and to closely monitor to prevent hypoglycemia in patients with AIS. (Class IIa; LOE C-LD)

Blood Glucose

Hypoglycemia (blood glucose <60 mg/dL) should be treated in patients with AIS. (Class I; LOE C-LD)

ELIGIBILITY RECOMMENDATIONS FOR IV ALTEPLASE IN PATIENTS WITH AIS (CLASS I)

Within 3 h

IV alteplase (0.9 mg/kg, maximum dose 90 mg over 60 min with initial 10% of dose given as bolus over 1 min) is recommended for selected patients who may be treated within 3 h of ischemic stroke symptom onset or patient last known well or at baseline state.

Physicians should review the criteria outlined in this table to determine patient eligibility. (Class I; LOE A)

Severity

For severe stroke symptoms, IV alteplase is indicated within 3 h from symptom onset of ischemic stroke. Despite increased risk of hemorrhagic transformation, there is still proven clinical benefit for patients with severe stroke symptoms. (Class I; LOE A)

For patients with mild but disabling stroke symptoms, IV alteplase is indicated within 3 h from symptom onset of ischemic stroke. There should be no exclusion for patients with mild but nonetheless disabling stroke symptoms, in the opinion of the treating physician, from treatment with IV alteplase because there is proven clinical benefit for those patients. (Class I; LOE B-R)

3–4.5 h

IV alteplase is also recommended for selected patients who can be treated within 3 and 4.5 h of ischemic stroke symptom onset or patient last known well. Physicians should review the criteria outlined in this table to determine patient eligibility. (Class I; LOE B-R)

Age, DM, Prior stroke, Severity, OACs, Imaging

IV alteplase treatment in the **3- to 4.5-h time window** is recommended for those patients **≤80 y of age, without a history of both DM and prior stroke, NIHSS score ≤25, not taking any OACs, and without imaging evidence of ischemic injury involving more than one third of the MCA territory.** (Class I; LOE B-R)

BP

IV alteplase is recommended in patients whose BP can be lowered safely (to **<185/110 mmHg**) with antihypertensive agents, with the physician assessing the stability of the BP before starting IV alteplase. (Class I; LOE B-NR)

Blood glucose

IV alteplase is recommended in otherwise eligible patients with initial glucose levels >50 mg/dL. (Class I; LOE A)

Prior antiplatelet therapy

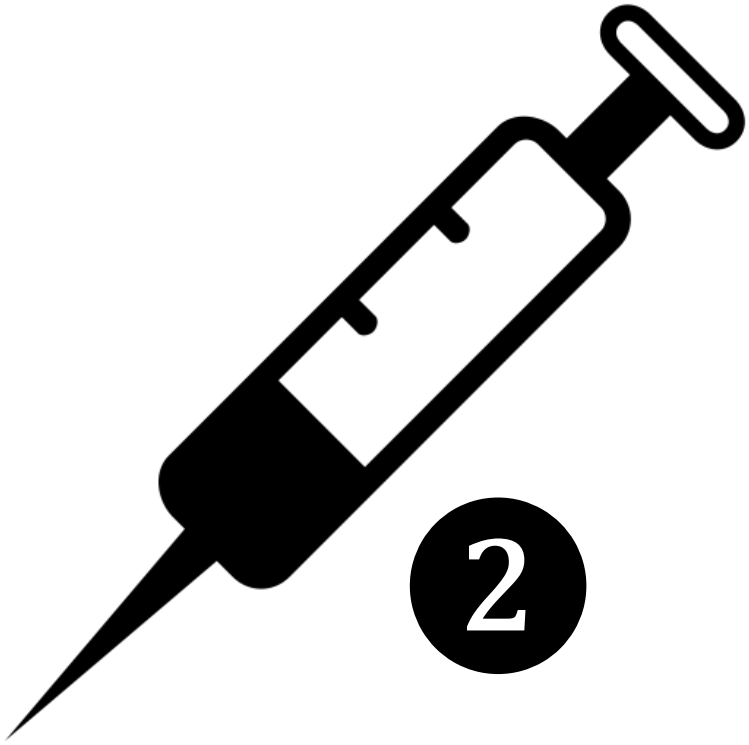
IV alteplase is recommended for patients taking antiplatelet drug monotherapy before stroke on the basis of evidence that the benefit of alteplase outweighs a possible small increased risk of sICH. (Class I; LOE A)

IV alteplase is recommended for patients taking antiplatelet drug combination therapy (eg, aspirin and clopidogrel) before stroke on the basis of evidence that the benefit of alteplase outweighs a probable increased risk of sICH. (Class I; LOE B-NR)

End-stage renal disease

In patients with end-stage renal disease on hemodialysis and normal aPTT, IV alteplase is recommended. (Class I; LOE C-LD)

However, those with elevated aPTT may have elevated risk for hemorrhagic complications



ADDITIONAL RECOMMENDATIONS FOR TREATMENT WITH IV ALTEPLASE FOR PATIENTS WITH AIS (CLASS II)

Extended 3- to 4.5-h window

For patients **>80 y** of age presenting in the 3- to 4.5-h window, IV alteplase is safe and can be as effective as in younger patients.(Class IIa; LOE B-NR)

For patients taking **warfarin and with an INR ≤1.7** who present in the 3- to 4.5-h window, IV alteplase appears safe and may be beneficial. (Class IIb; LOE B-NR)

In AIS patients with **prior stroke and DM** presenting in the 3- to 4.5- h window, IV alteplase may be as effective as treatment in the 0- to 3-h window and may be a reasonable option. (Class IIb; LOE B-NR)

Preexisting disability

Preexisting disability does not seem to independently increase the risk of sICH after IV alteplase, but it may be associated with **less neurological improvement** and **higher mortality**. Thrombolytic therapy with IV alteplase for acute stroke patients with preexisting disability (mRS score ≥2) may be reasonable, but decisions should take into account relevant factors, including quality of life, social support, place of residence, need for a caregiver, patients' and families' preferences, and goals of care. (Class IIb; LOE B-NR)

Seizure at onset

IV alteplase is reasonable in patients with a seizure at the time of onset of acute stroke if evidence suggests that residual impairments are secondary to stroke and not a postictal phenomenon. (Class IIa; LOE C-LD)

Blood glucose

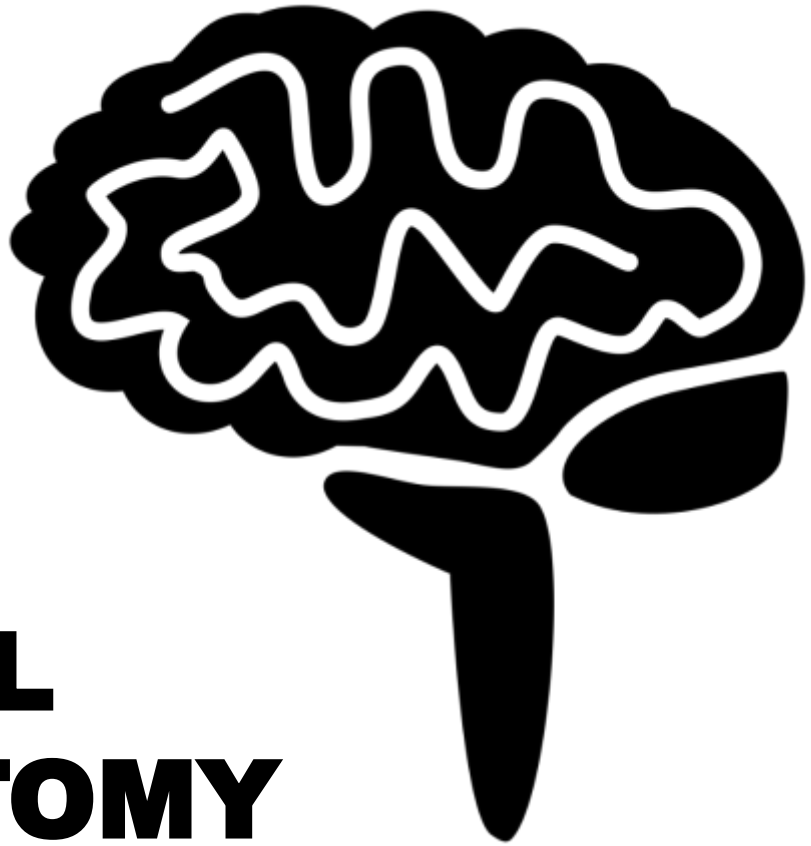
Treatment with IV alteplase in patients with AIS who present with initial glucose levels <50 or >400 mg/dL that are subsequently normalized and who are otherwise eligible may be reasonable. (Class IIb; LOE C-LD)

IV Alteplase

In patients undergoing fibrinolytic therapy, physicians should be prepared to treat potential emergent adverse effects, including **bleeding** complications and **angioedema** that may cause partial airway obstruction. (Class I; LOE B-NR)

IV Alteplase

BP should be maintained **<180/105 mmHg** for at least **the first 24 hours** after IV alteplase treatment. (Class I; LOE B-NR)



MECHANICAL THROMBECTOMY

Patients eligible for IV alteplase should receive IV alteplase even if EVTs are being considered. (Class I; LOE A)

In patients under consideration for mechanical thrombectomy, observation after IV alteplase to assess for clinical response should not be performed. (Class III: Harm; LOE B-R)

Patients should receive mechanical thrombectomy with a stent retriever if they meet all the following criteria:

1) **pre-stroke mRS score of 0 to 1**
2) **causative occlusion of the ICA or MCA-M1**
3) **age ≥18 years**
4) **NIHSS ≥6**
5) **Alberta Stroke Program Early CT Score (ASPECTS) ≥6**
6) **treatment can be initiated (groin puncture) within 6 hours of symptom onset**

(Class I; LOE A)

In selected patients with AIS within **6 to 16 hours** of last known normal who have LVO in the anterior circulation and meet other **DAWN or DEFUSE 3 eligibility criteria**, mechanical thrombectomy is recommended. (Class I; LOE A)

In selected patients with AIS within **6 to 24 hours** of last known normal who have LVO in the anterior circulation and meet other **DAWN eligibility criteria**, mechanical thrombectomy is recommended. (Class IIa; LOE B-R)

ANTIPLATELET TREATMENT

Administration of **aspirin** is recommended in patients with AIS within 24 to 48 hours after onset.

For those treated with IV alteplase, aspirin administration is generally delayed until 24 hours later but might be considered in the presence of concomitant conditions for which such treatment given in the absence of IV alteplase. (Class I; LOE A)

In patients presenting with minor stroke, treatment for 21 days with **dual antiplatelet therapy** (aspirin and clopidogrel) begun within 24 hours can be beneficial for early secondary stroke prevention for a period of up to 90 days from symptom onset. (Class IIa; LOE B-R)

ANTICOAGULANTS

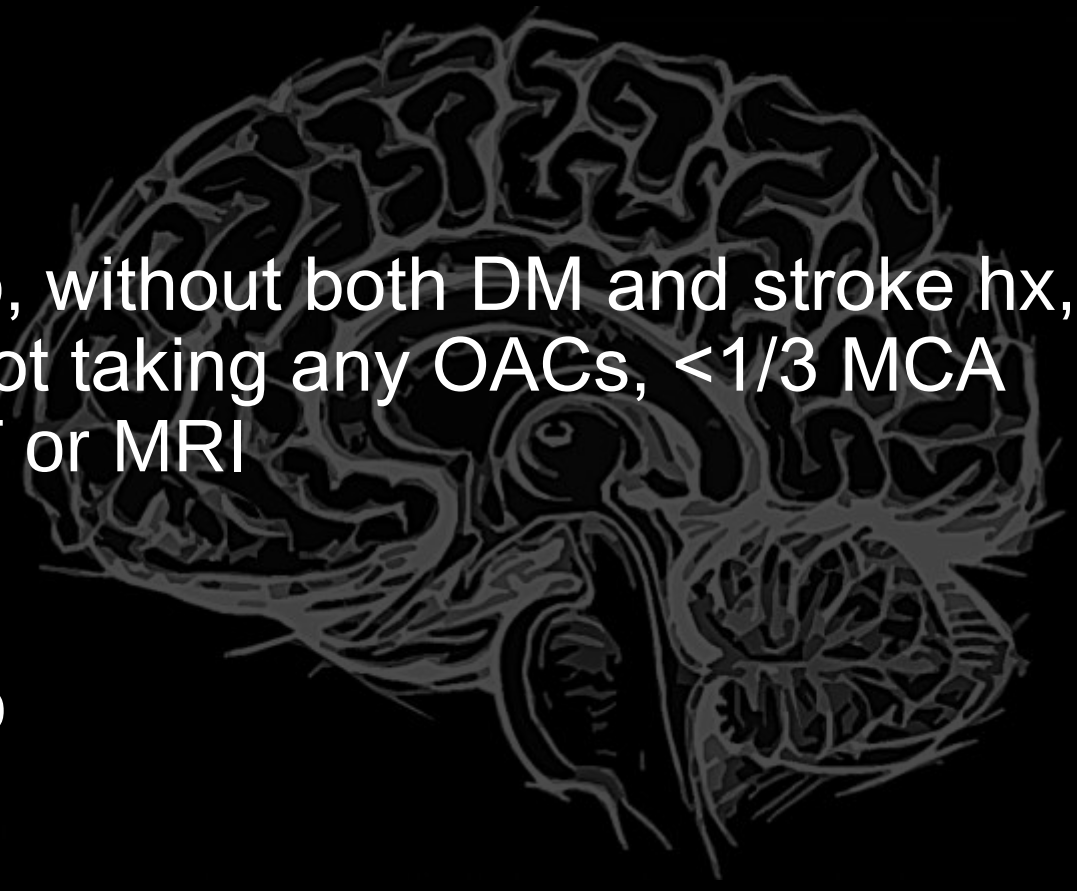
Urgent **anticoagulation**, with the goal of preventing early recurrent stroke, halting neurological worsening, or improving outcomes after AIS, is not recommended for treatment of patients with AIS. (Class III: No benefit; LOE A)

2018 Stroke Guidelines

Class I

- CT within 20 minutes ≥50%
- Door-to-needle time within 60 minutes ≥50%
- EVT, ECG, troponin should not delay IV t-PA
- Only the assessment of blood glucose must precede the initiation of IV t-PA
- Receive IV t-PA: BP <185/110 mmHg
- IV t-PA for AIS < 3 hr

IV t-PA for AIS < 3 – 4.5 hr



Class I

- for pts ≤80 y/o, without both DM and stroke hx, NIHSS ≤25, not taking any OACs, <1/3 MCA territory by CT or MRI

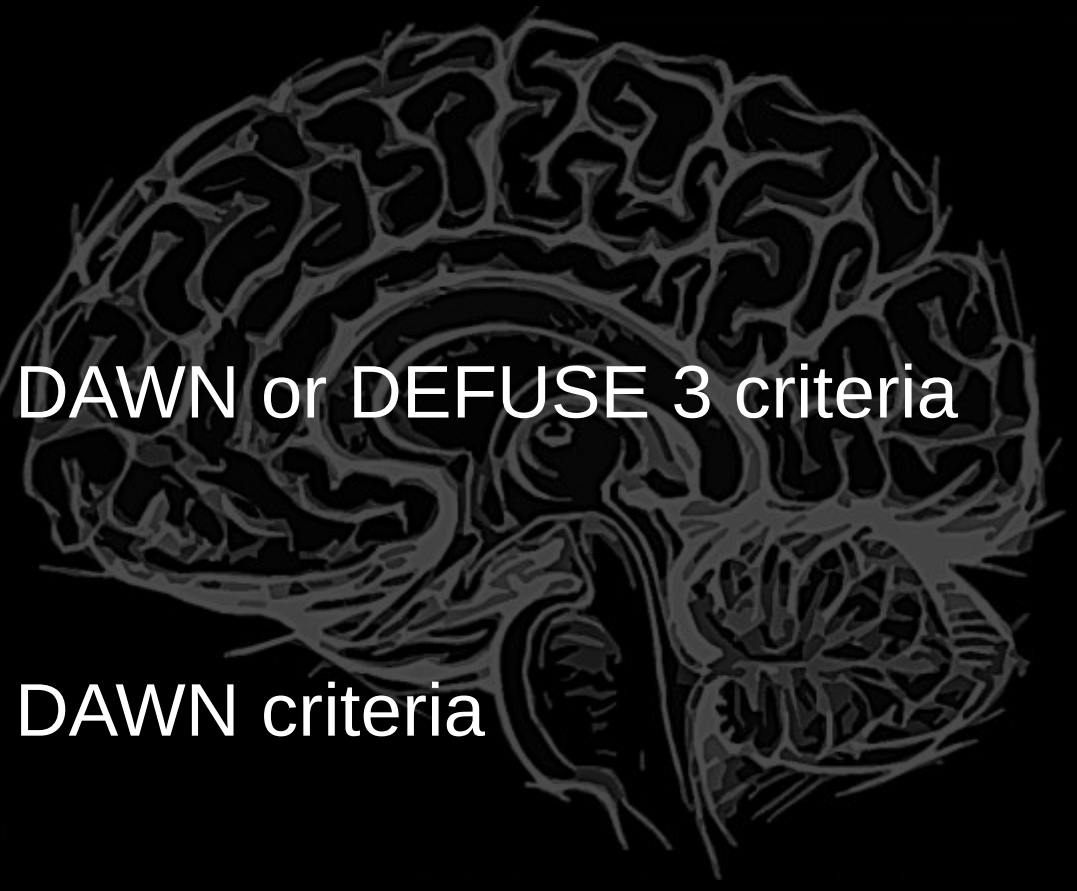
Class IIa

- for pts >80 y/o

Class IIb

- taking OACs and INR ≤1.7 and/or PT <15 s
- with both DM and stroke hx

Endovascular Therapy



Class I

- AIS < 6 hr
- AIS < 6-16 hr: DAWN or DEFUSE 3 criteria

Class IIa

- AIS < 6-24 hr: DAWN criteria