# IN THE NAME OF GOD

# STROKE RISK FACTORS AND TREATMENT

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# What is a stroke?

## A STROKE IS A MEDICAL EMERGENCY!

A STROKE OCCURS WHEN THE BLOOD FLOW TO A PART OF THE BRAIN IS INTERRUPTED

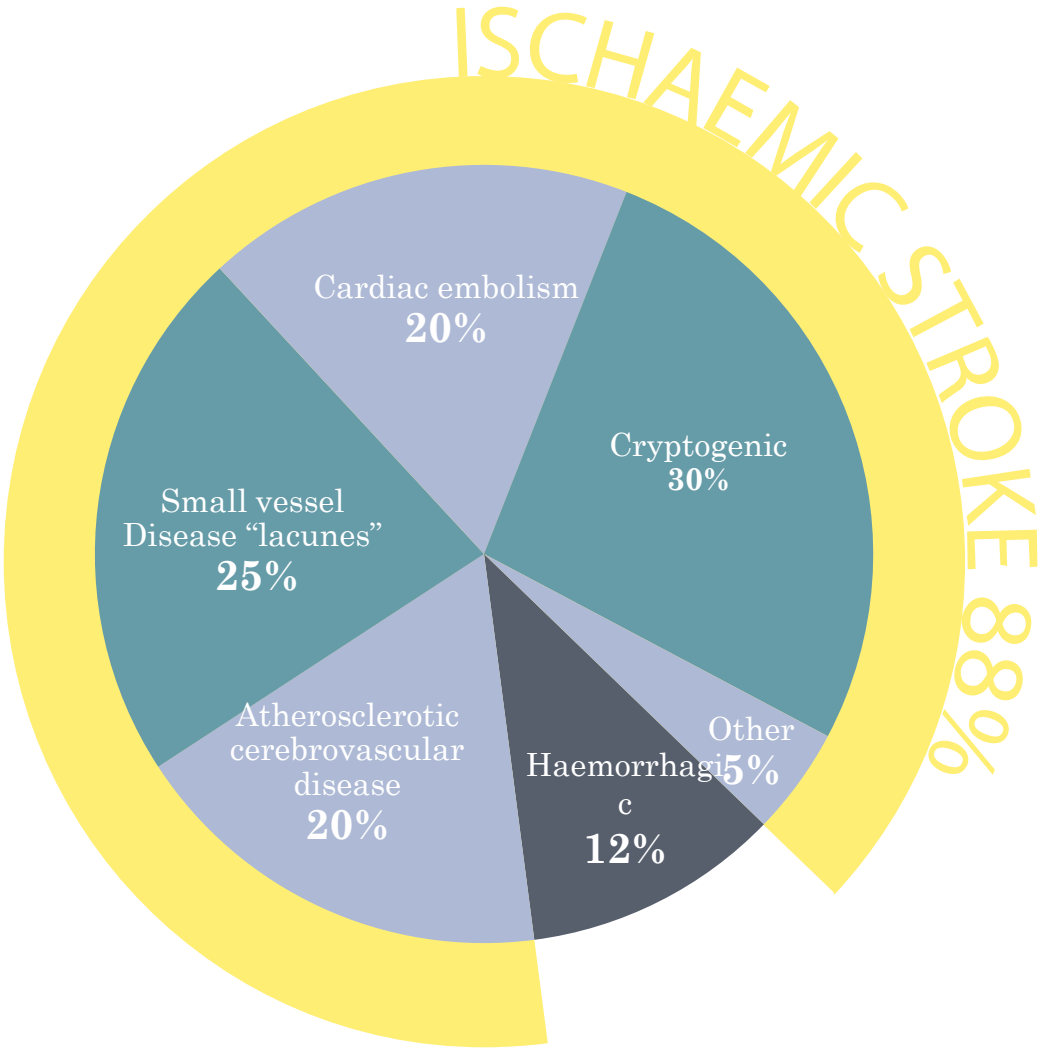
LACK OF BLOOD SUPPLY MEANS THAT NOT ENOUGH OXYGEN OR NUTRIENTS REACH THE BRAIN AND THE BRAIN CELLS BECOME DAMAGED OR PERMANENTLY DESTROYED

DEPENDING ON WHICH PART OF THE BRAIN IS AFFECTED, DIFFERENT SYMPTOMS CAN OCCUR

IF NOT TREATED IN TIME, A STROKE CAN HAVE EMOTIONAL, PHYSICAL OR EVEN FATAL CONSEQUENCES

stroke foundation

# Stroke types and incidence



# Stroke is a Major Public Health Problem

## STROKE CAN AFFECT ANYONE AT ANY TIME

**6 MILLION**

WORLDWIDE, NEARLY 6 MILLION PEOPLE **DIE** EACH **YEAR** FROM A STROKE[1,2]

**1 IN 4**

WORLDWIDE, 1 IN 4 PEOPLE ON AVERAGE WILL SUFFER A STROKE IN **THEIR LIFETIME**[1]

**EVERY 6 SECONDS**

EVERY 6 SECONDS, SOMEONE **DIES** FROM A STROKE[1,2]


1. World Stroke Organization Campaign. http://www.world-stroke.org/advocacy/world-stroke-campaign
2. MacKay J, Mensah G. WHO, 2004. http://www.who.int/cardiovascular_diseases/resources/atlas/en/#

# How do I know if someone is having a stroke?

## BE SUSPICIOUS OF A STROKE IF ANY OF THE FOLLOWING SYMPTOMS OCCUR

# RISK FACTORS

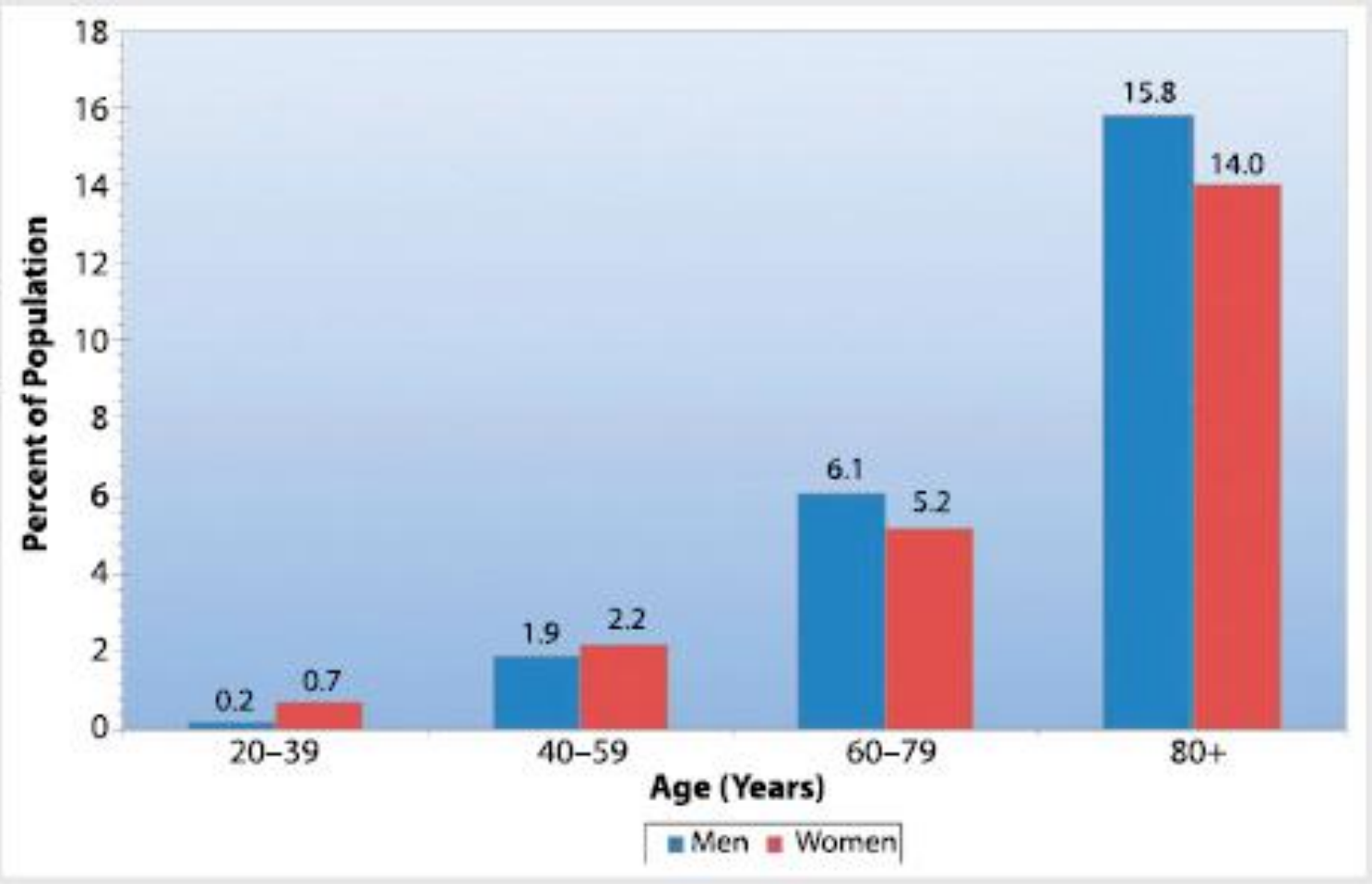
## Modifiable

- Hypertension
- Diabetes mellitus
- Atrial fibrillation
- Dyslipidemia
- Smoking tobacco
- Sedentary lifestyle
- Kidney disease
- Sleep apnea
- Heavy alcohol intake
- Diet

## Nonmodifiable

- Male sex
- Genetic susceptibility
- Age

# AGE AND SEX IN STROKE



# HTN

**Hypertension is now defined by a blood pressure >130/ 80 mm Hg Multiple studies have demonstrated a benefit to reducing blood pressure to <140/85 mm Hg**

**A more aggressive goal of a systolic blood pressure <130 mm Hg in patients with small vessel stroke was shown to reduce hemorrhagic stroke risk by 63% but did not significantly reduce ischemic stroke risk.**

**However, in patients who have diabetes mellitus, an aggressive blood pressure reduction to a systolic blood pressure <120 mm Hg reduced the risk of any stroke by 41%.**

**Patients with hypertension should be treated with lifestyle and medical therapy to achieve a blood pressure <120/80 mm Hg**

# Diabetes Mellitus

**Diabetes mellitus is an independent risk factor for stroke**

**It conveys greater risk in patients younger than 65 years of age and in women.**

**Duration of diabetes mellitus of more than 3 years increases the risk of stroke by 74%,**

**A glycated hemoglobin goal of less than 7% has been recommended to prevent microvascular complications of type II diabetes.**

# Atrial Fibrillation

**Atrial fibrillation is an important mechanism of stroke, particularly in the Elderly.**

**The prevalence of atrial fibrillation increases with age, and women are at a higher risk of having a stroke due to atrial fibrillation**

**Both paroxysmal and permanent atrial fibrillation convey risk**

**Oral anticoagulant therapy with a direct oral anticoagulant (dabigatran, rivaroxaban, apixaban, edoxaban) or warfarin can significantly reduce the risk of stroke.**

**The risk of stroke in atrial fibrillation can be assessed by using the $CHA_2DS_2VASc$ (congestive heart failure, hypertension, age 75 years or older, diabetesmellitus, stroke, vascular disease, age 65 to 74 years, sex category [female sex]) score**

**Anticoagulation is recommended for patients with a $CHADS_2$-VASc score of 1 orgreater unless the score is solely based on female sex, in which case another risk factor is required**

# Dyslipidemia

**Although high levels of cholesterol and low-density lipoprotein predispose to ischemic stroke (especially of atherosclerotic mechanism), low levels have been associated with an increased risk of intracerebral hemorrhage.**

**Although some studies report an association between either low high-density lipoprotein or high triglycerides and stroke, others have found no association.**

**Diet and lifestyle changes are the first step in reducing stroke risk.**

# Smoking

**Active smoking increases the risk of stroke 2 to 4times.**

**Smoking cessation is effective in reducing risk and can be achieved through counseling in combination with medications (nicotine replacement, bupropion, varenicline)**

**Passive exposure to secondhand smoke also increases stroke risk by 25%**

# Sedentary Lifestyle

**Physical inactivity is a risk factor for stroke.**

**Several trials have demonstrated the protective effect of physical activity.**

**Moderate to vigorous–intensity aerobic exercise for at least 30 minutes a day, 3 to 4 times a week is recommended**

# Kidney Disease

**Several studies have identified kidney disease as a risk factor for stroke.**

**The risk of stroke is 5 to 30 times higher in patients with chronic kidney disease, especially in patients on dialysis.**

**Blood pressure control is particularly important to prevent stroke in this population.**

# Sleep Apnea

**Sleep apnea is a common condition and has been associated with stroke.**

**the Epworth Sleepiness Scale or Berlin Questionnaire, can be used to screen patients who may be considered for polysomnography**

# Alcohol Intake

**The association between alcohol consumption and ischemic stroke is described as J-shaped in that the risk of stroke is higher with abstinence versus low intake (1 drink per day for women, ≤2 drinks per day for men).**

**There is also a relationship between heavy alcohol use and intracerebral hemorrhage.**

**Patients who do not drink alcohol should not be encouraged to start.**

**People who drink heavily should be advised to limit their intake**

# Diet

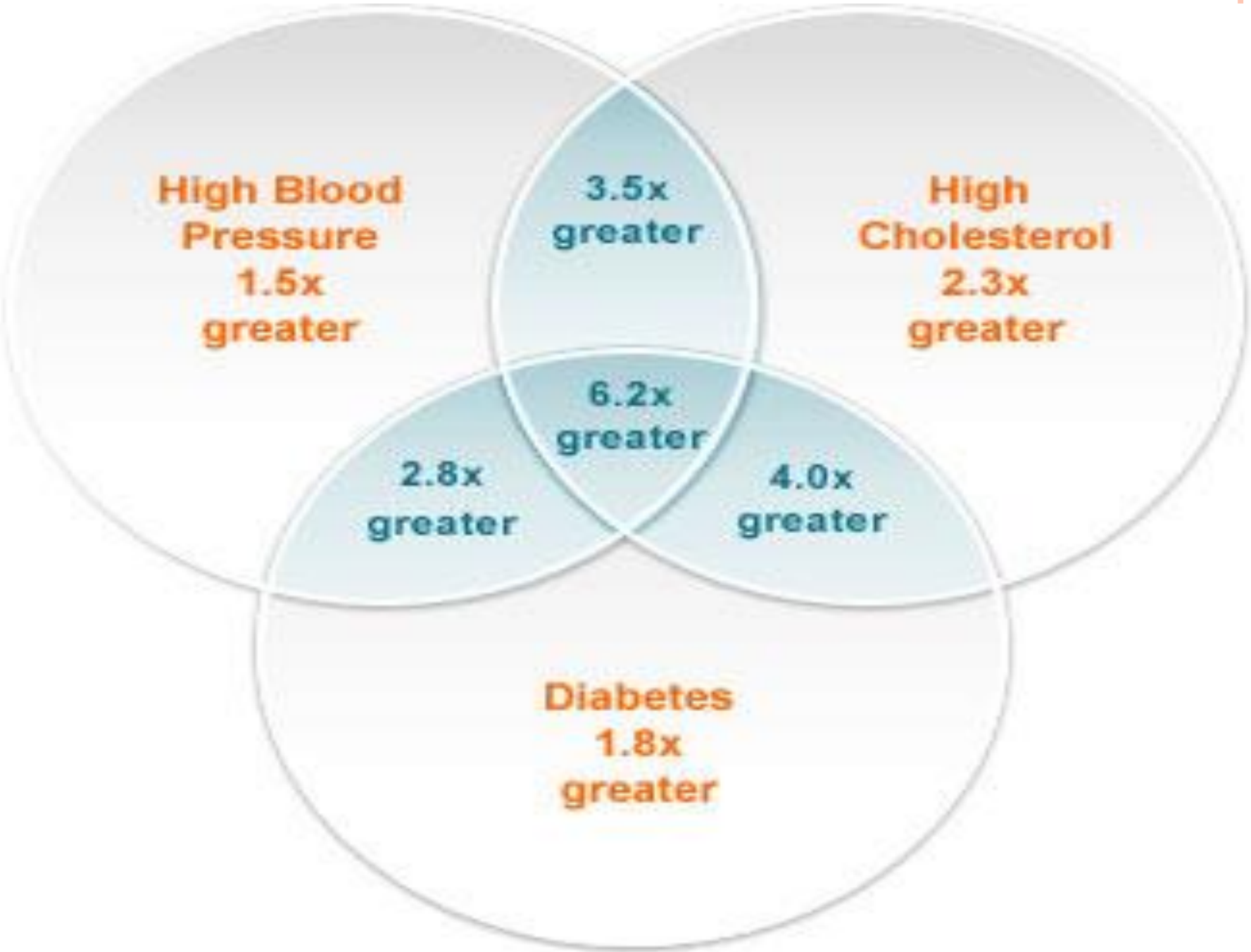
**A diet rich in fruits and vegetables may be beneficial in reducing risk of stroke.**

**In addition, the Dietary Approaches to Stop Hypertension (DASH) and Mediterranean diets appear to provide a protective effectemphasize fruits, vegetables, fish, legumes, and white meat and are low in sodium and high in potassium**

# CONCLUSION

**Up to 90% of all first strokes can be prevented with risk factor modification.**

**This emphasizes the importance of reinforcing healthy lifestyle choices in childhood and screening for modifiable risk factors in young and middle-aged adults**


High Blood Pressure 1.5x greater
3.5x greater
High Cholesterol 2.3x greater
6.2x greater
2.8x greater
4.0x greater
Diabetes 1.8x greater

**Time lost is Brain lost**

# Face Arm Speech Test (F.A.S.T.)

**TO CHECK FOR STROKE SYMPTOMS, REMEMBER F.A.S.T.**

**Face**

FACE DROOPING
or asymmetry on smiling

**Arms**

ARM WEAKNESS
or paralysis on one side

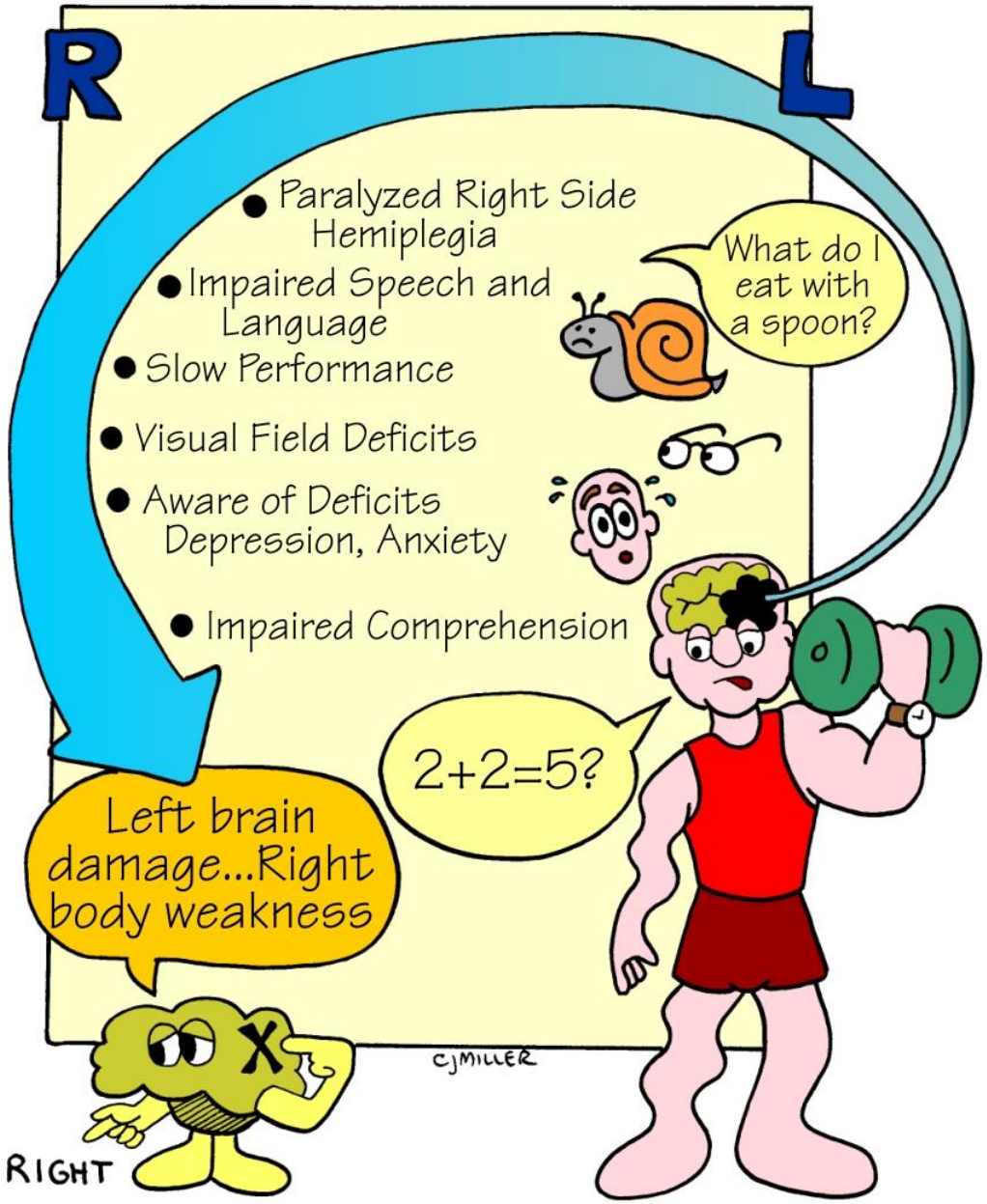
**Speech**

SPEECH DIFFICULTY
or slurring of speech

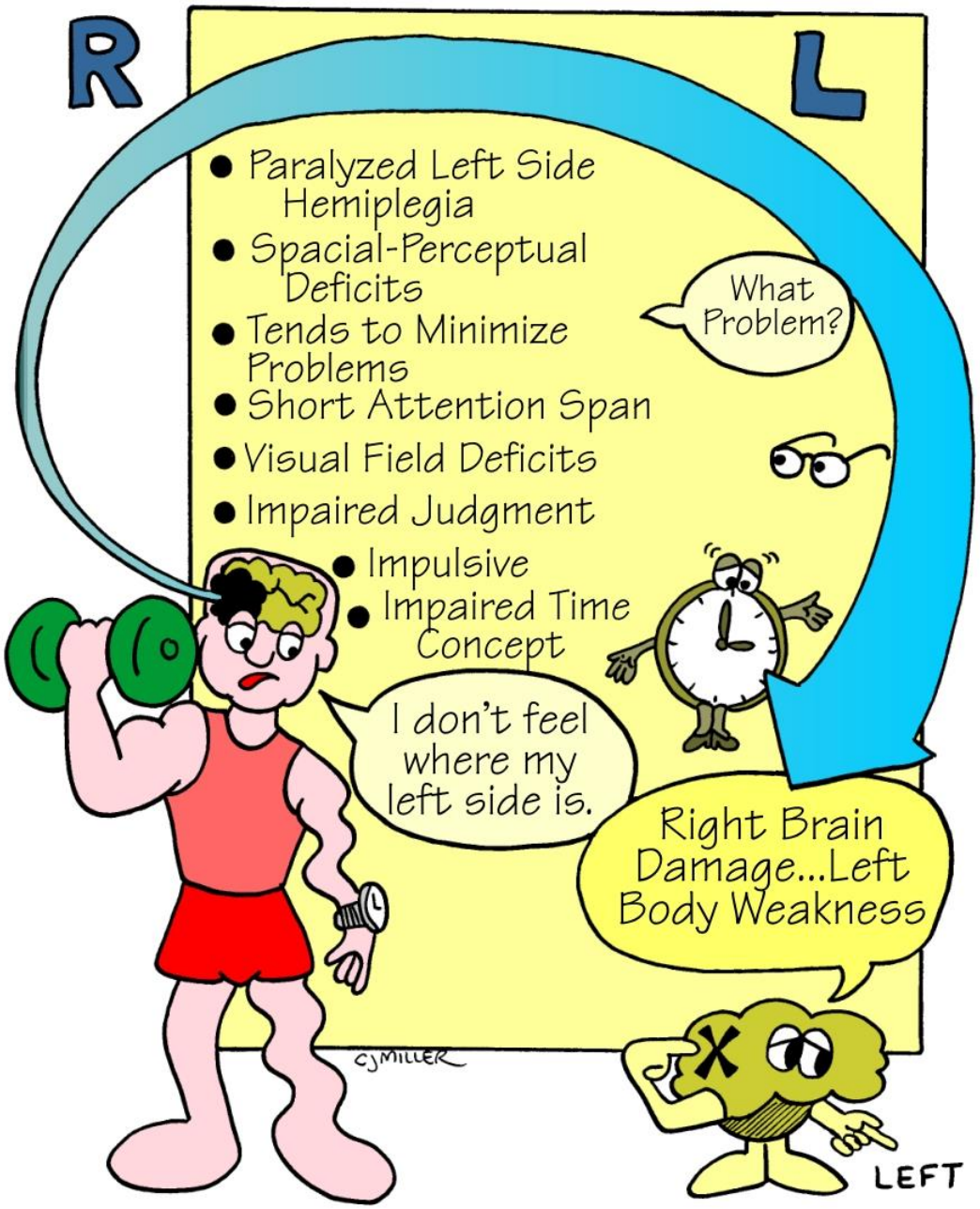
**Time**


TIME TO CALL
the emergency services*

# LEFT CVA



# RIGHT CVA



# ACTILYSE:

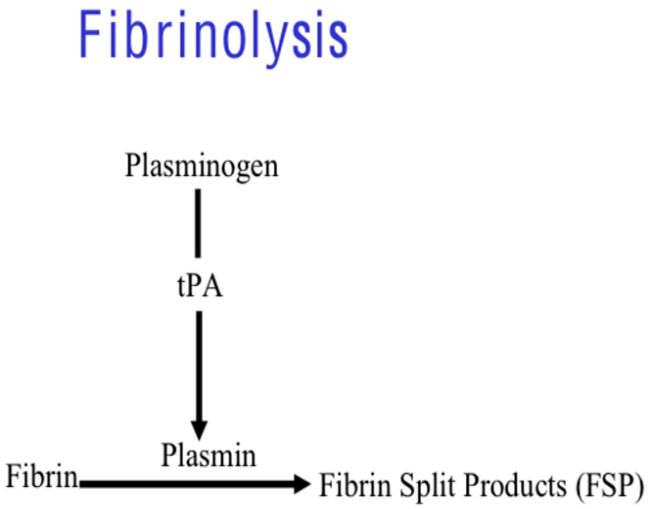
IT IS A RECOMBINANT DNA-DERIVED VERSION OF A NATURALLY OCCURRING TISSUE PLASMINOGEN ACTIVATOR PROTEIN NORMALLY SECRETED BY HUMAN ENDOTHELIAL CELLS.

PURIFIED GLYCOPROTEIN WITH 527 AMINO ACIDS

CONVERTS PLASMINOGEN IN THE PRESENCE OF FIBRIN TO PLASMIN

SHORT HALF-LIFE <5MIN

CLEARED BY THE LIVER



# ACTILYSE:

ACTILYSE IS SUPPLIED IN VIALS AS A DRY POWDER AND SOLVENT FOR INJECTION AND INFUSION.

THE RECONSTITUTED SOLUTION CONTAINS
1 MG ALTEPLASE/1 ML.

1 VIAL WITH 467 MG POWDER CONTAINS:
10 MG ALTEPLASE, OR

1 VIAL WITH 933 MG POWDER CONTAINS:
20 MG ALTEPLASE, OR

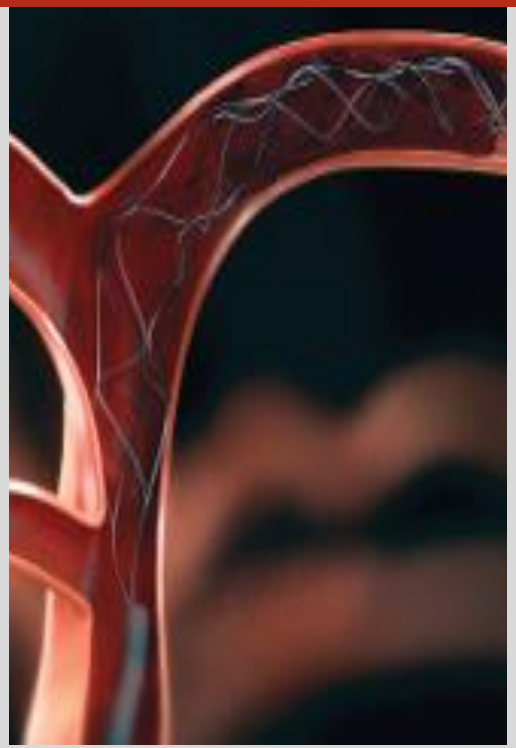
**1 VIAL WITH 2333 MG POWDER CONTAINS:**
**50 MG ALTEPLASE**.

# FEW IMPORTANT CHANGES UPDATED GUIDELINES

American Heart Association | American Stroke Association
life is why

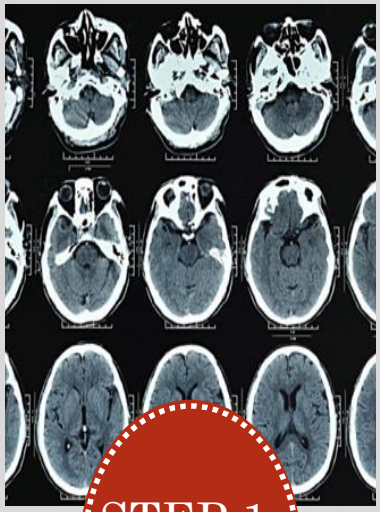
**PATIENTS ELIGIBLE FOR INTRAVENOUS rt-PA SHOULD RECEIVE INTRAVENOUS rt-PA EVEN IF ENDOVASCULAR TREATMENTS ARE BEING CONSIDERED (CLASS I; LEVEL OF EVIDENCE A).**





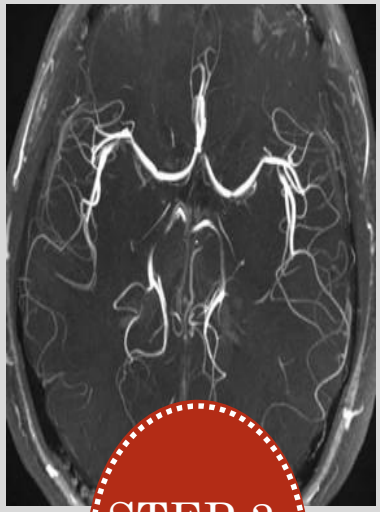
IF ENDOVASCULAR THERAPY IS CONTEMPLATED, A NON-INVASIVE INTRACRANIAL VASCULAR STUDY IS STRONGLY RECOMMENDED DURING THE INITIAL IMAGING EVALUATION OF THE ACUTE STROKE PATIENT BUT SHOULD NOT DELAY INTRAVENOUS rt-PA IF INDICATED.

THE BENEFITS OF ADDITIONAL IMAGING BEYOND CT AND CTA OR MR AND MRA, SUCH AS CT PERFUSION OR DIFFUSION- AND PERFUSION-WEIGHTED IMAGING, FOR SELECTING PATIENTS FOR ENDOVASCULAR THERAPY ARE UNKNOWN *(CLASS IIB; LEVEL OF EVIDENCE C)*.

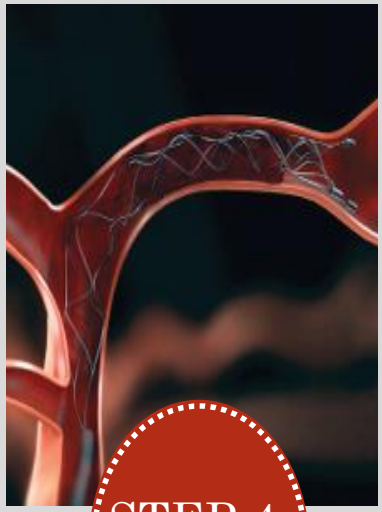


STEP 1: Plain CT


STEP 2: rt-PA



STEP 3: CT Angio



STEP 4: ndovascul

| American Heart Association Guideline 2019[1] | US Food and Drug Administration (FDA) Package Insert 2015[14] |
|---|---|
| **Indications** | |
| Diagnosis of ischemic stroke with disabling neurologic deficit (regardless of severity) | Same |
| Symptom onset[b] within 4.5 hours | Within 3 hours |
| Wake-up stroke with diffusion-weighted imaging-FLAIR mismatch on MRI[c] | Not mentioned |
| Age ≥18 years | Warning for age >77 years with risk factors for intracranial hemorrhage |
| **Contraindications[d]** | |
| Severe head trauma within 3 months | Contraindicated |
| Ischemic stroke within 3 months | Removed[e] |
| Previous intracranial hemorrhage | Warning for recent intracranial hemorrhage (contraindicated if active intracranial hemorrhage) |
| Suspected subarachnoid hemorrhage | Contraindicated |
| Suspected infective endocarditis | Not listed |
| Suspected aortic arch dissection | Not listed |
| Recent intracranial or intraspinal surgery (within 3 months) | Contraindicated |
| Intracranial intraaxial neoplasm | Not listed |
| Gastrointestinal malignancy or gastrointestinal bleeding within previous 21 days | Warning |

| American Heart Association Guideline 2019[1] | US Food and Drug Administration (FDA) Package Insert 2015[14] |
|---|---|
| **Contraindications[d]** | |
| Active internal bleeding | Contraindicated |
| Systolic blood pressure (BP) >185 mm Hg or diastolic BP >110 mm Hg that cannot be lowered safely | Contraindicated for severe uncontrolled hypertension (BP values removed[e]); warning for BP >175/110 mm Hg |
| Bleeding diathesis<br>International normalized ratio (INR) >1.7<br>Heparin within 48 hours with abnormal activated partial thromboplastin time<br>Low-molecular-weight heparin full treatment dose within previous 24 hours<br>Platelets <100,000/mm$^3$<br>Current use of direct thrombin inhibitor or factor Xa inhibitor with abnormal coagulation tests[f] | Contraindicated for bleeding diathesis (laboratory values removed[e]) |
| CT showing acute hemorrhage | Contraindicated |
| CT showing extensive hypodensity (eg, >1/3 of the cerebral hemisphere) | Removed[e] |

# SECONDARY PREVENTATION

| | Acute Phase (hours to days) | Chronic Phase (months to years) |
|---|---|---|
| **Aspirin monotherapy** | Aspirin 160-325 mg daily | Aspirin 81 mg daily |
| **Clopidogrel monotherapy** | Not specifically evaluated | Clopidogrel 75 mg daily |
| **Aspirin and clopidogrel combination therapy** | For minor stroke or transient ischemic attack; clopidogrel 300-600 mg load, followed by 75 mg daily for 21 days and then aspirin or clopidogrel monotherapy; reasonable to start within 24-72 hours of symptom onset | Not recommended |
| **Extended-release dipyridamole and aspirin** | Not recommended | Extended-release dipyridamole 200 mg plus aspirin 25 mg 2 times a day |

APRIL 2020 VOL. 26 NO. 2 **Cerebrovascular Disease**

# ABCD2 Score for Risk of Recurrent Stroke After Transient Ischemic Attack

| Clinical Characteristic | Points |
|---|---|
| **Age of 60 years or older** | |
| No | +0 |
| Yes | +1 |
| **Blood pressure ≥140/90 mm Hg** | |
| No | +0 |
| Yes | +1 |
| **Clinical features** | |
| Unilateral weakness | +2 |
| Speech disturbance without weakness | +1 |
| Other symptoms | +0 |
| **Duration of symptoms** | |
| <10 minutes | +0 |
| 10–59 minutes | +1 |
| ≥60 minutes | +2 |
| **Diabetes mellitus** | |
| No | +0 |
| Yes | +1 |

APRIL 2020 VOL. 26 NO. 2 **Cerebrovascular Disease**

## Predicted Risk of Recurrent Stroke After Transient Ischemic Attack[a]

| ABCD[2] Score | Risk Category | Stroke Risk (%) | | |
|---|---|---|---|---|
| | | 2-day | 7-day | 90-day |
| 0–3 | Low | 1.0 | 1.2 | 3.1 |
| 4–5 | Moderate | 4.2 | 5.9 | 9.8 |
| 6–7 | High | 8.1 | 11.7 | 17.8 |

# Anti coagulant therapy

- The cardioembolic
- indications that typically justify anticoagulation include nonvalvular atrial
- fibrillation (discussed in detail below), known left atrial or left ventricular
- thrombus, acute anterior ST-segment elevation myocardial infarction with
- anterior apical akinesis or dyskinesis, mechanical left ventricular assist device,
- left ventricular ejection fraction less than 35%, and valvular heart disease
- including rheumatic mitral valve disease or mechanical prosthetic heart valve in the aortic or mitral position.

# NOAC

- **Direct oral anticoagulants**
- **have fixed dosing without the need for frequent monitoring.**
- **fewer drug-drug interactions.**
- **more rapid and predictable onset of action than warfarin.**

| Property | Warfarin | Rivaroxaban | Dabigatran | Apixaban | Edoxaban |
|---|---|---|---|---|---|
| **Mechanism** | Vitamin K antagonist | Factor Xa inhibitor | Direct thrombin inhibitor | Factor Xa inhibitor | Factor Xa inhibitor |
| **Typical dose for atrial fibrillation** | Variable | 20 mg daily | 150 mg 2 times a day | 5 mg 2 times a day | 60 mg daily |
| **Renal dose adjustment** | No | Yes | Yes | Yes | Yes |
| **Half-life** | 20-60 hours | 5-9 hours | 12-17 hours | ~12 hours | 8-10 hours |
| **Onset of action** | 24-72 hours | 3-4 hours | 0.5-2 hours | 3-4 hours | 1-2 hours |

## HAS-BLED Score to Estimate the Risk of Hemorrhage with Warfarin[a]

| HAS-BLED Score[b] | Bleeding Risk Percentage (95% Confidence Interval) | Recommendation |
|---|---|---|
| 0 | 0.9 (0.4–1.9) | None |
| 1 | 3.4 (2.5–4.6) | None |
| 2 | 4.1 (2.9–5.6) | None |
| 3 | 5.8 (3.9–8.3) | Caution warranted |
| 4 | 8.9 (5.2–14.0) | Caution warranted |
| 5 | 9.1 (1.1–29.2) | Caution warranted |
| ≥6 | Insufficient data | Caution warranted |

[a] Modified with permission from Pisters R, et al, Chest.[50] © 2010 Elsevier B.V. and Lip GY, et al, J Am Coll Cardiol.[51] © 2011 JACC: Journal of the American College of Cardiology.

[b] HAS-BLED Score

| | |
|---|---|
| **H**ypertension (uncontrolled, systolic blood pressure >160 mm Hg) | 1 point |
| **A**bnormal renal or liver function | |
| Renal: chronic dialysis, renal transplantation, or creatinine ≥ 2.26 mg/dL | 1 point |
| Liver: cirrhosis or bilirubin >2× the upper limit of normal and aspartate transaminase, alanine transaminase, or alkaline phosphatase >3× the upper limit of normal | 1 point |
| **S**troke | 1 point |
| **B**leeding predisposition or history of major bleeding | 1 point |
| **L**abile INRs (unstable/high INRs, time in therapeutic range <60%) | 1 point |
| **E**lderly (age > 65 years) | 1 point |
| **D**rugs or alcohol | |
| Antiplatelet agents or nonsteroidal anti-inflammatory drugs | 1 point |
| Excess alcohol use (8 drinks/wk) | 1 point |

# 2017 AHA/ACC Hypertension Guideline

## Blood Pressure Categories

American Heart Association | American Stroke Association

| BLOOD PRESSURE CATEGORY | SYSTOLIC mm Hg (upper number) | | DIASTOLIC mm Hg (lower number) |
|---|---|---|---|
| NORMAL | LESS THAN 120 | and | LESS THAN 80 |
| ELEVATED | 120 – 129 | and | LESS THAN 80 |
| HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1 | 130 – 139 | or | 80 – 89 |
| HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2 | 140 OR HIGHER | or | 90 OR HIGHER |

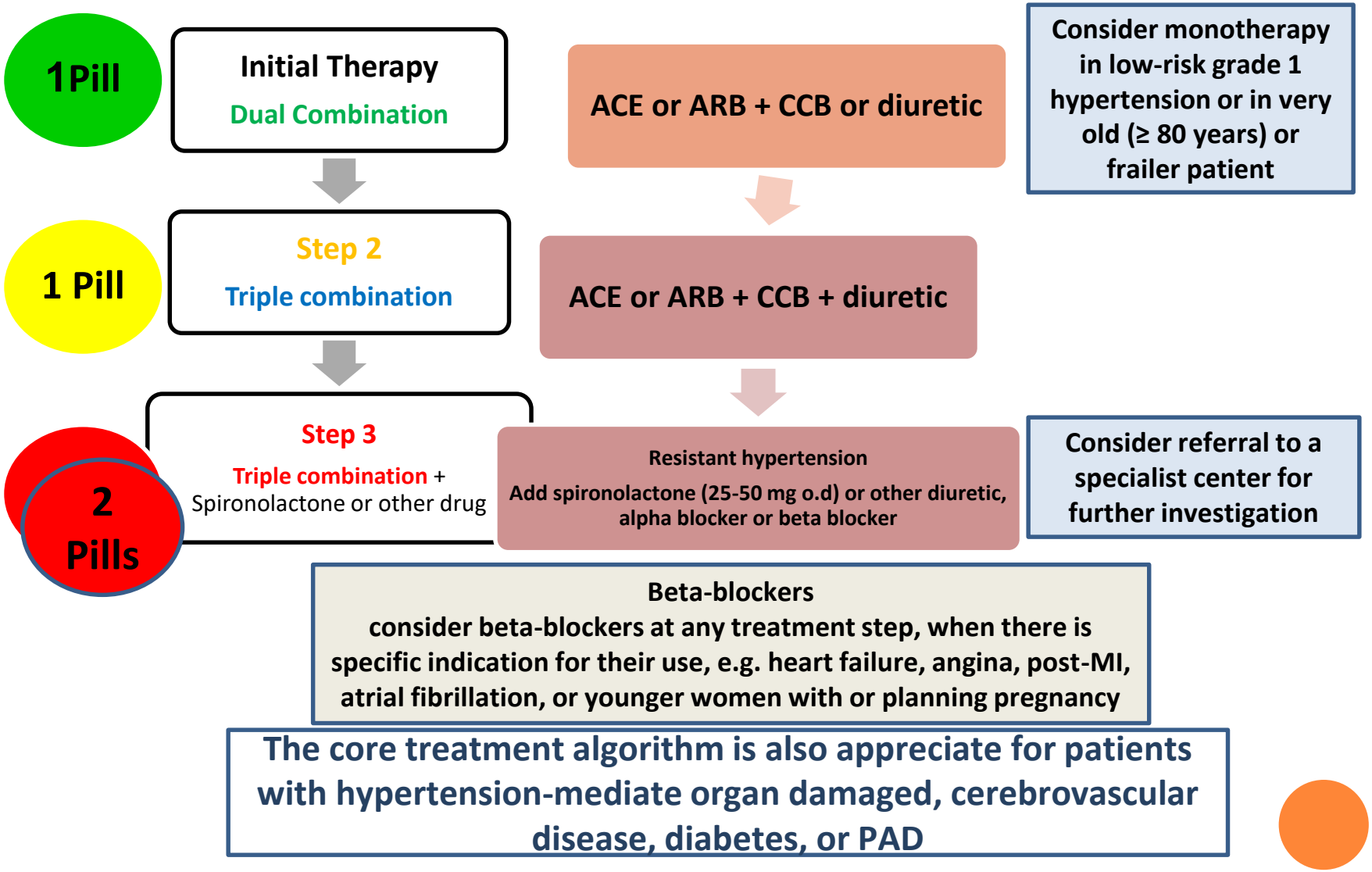
# HTN

- Hypertension is an important target for secondary stroke prevention
- combination of an angiotensin-converting enzyme inhibitor and a diuretic, otherAcute antihypertensive therapy is typically indicated **when blood pressure is >220/120 mm Hg**

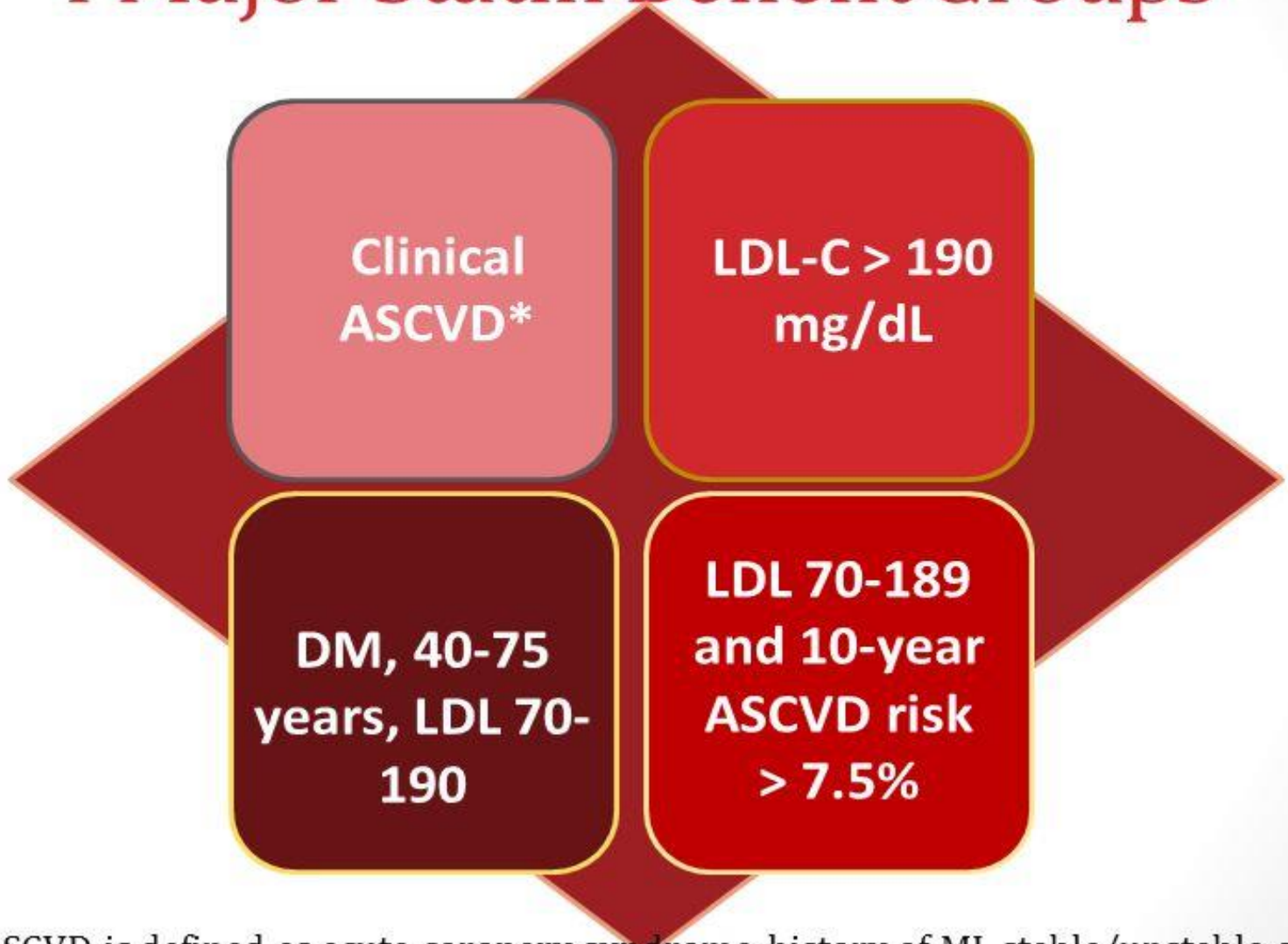
- **but more** stringent goals can be justified when other conditions such as end organ damage, aortic dissection, or preeclampsia/ eclampsia are apparent.

- For patients who have received intravenous (IV) thrombolytic therapy, blood pressure should bemaintained **<180/105mmHg for the first 24 hours**.

# Core drug-treatment strategy for uncomplicated hypertension

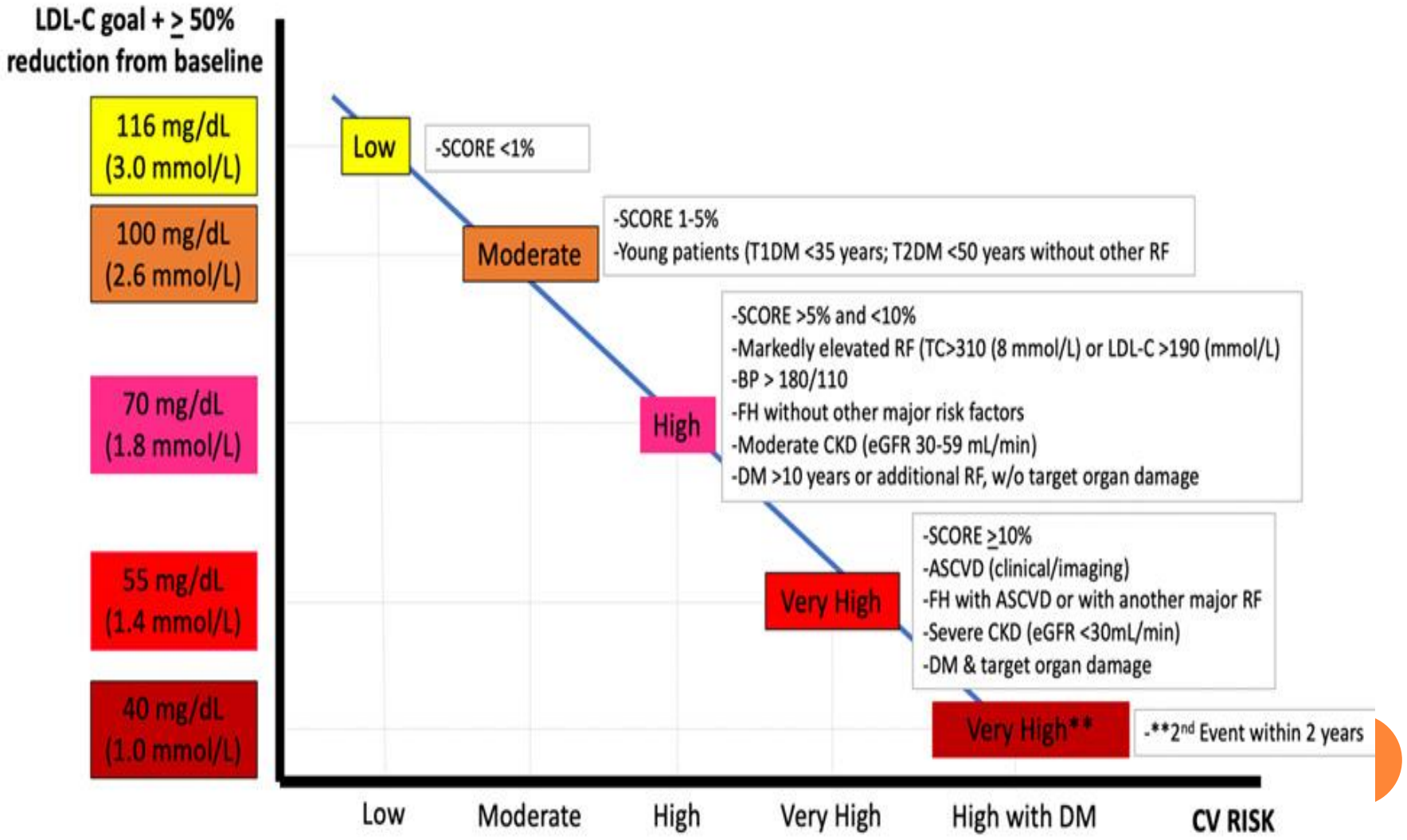


# 2013 ACC/AHA Guidelines:
## 4 Major Statin Benefit Groups




*Clinical ASCVD is defined as acute coronary syndrome, history of MI, stable/unstable angina, coronary or other revascularization, stroke, TIA, or PAD.

# European treatment goal for LDL-C across categories of total CVD risk



# THANK YOU