Clinical Neurological Society of America

Stroke Prevention & Risk Factor Stratification

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Disclosures

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- Stroke Editorial Board Member *UpToDate*

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Objectives

To provide a concise and updated overview of primary and secondary ischemic stroke prevention based on current guidelines and best evidence

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Stroke Prevention and Risk Stratification
USA Data

- 795,000 strokes annually
- 610,000 first attacks
- 185,000 recurrent attacks
- 87% Ischemic Strokes (IS)
- 10% Intracerebral Hemorrhage (ICH)
- 3% Subarachnoid Hemorrhage (SAH)

Every 40 seconds one person in the USA has a stroke

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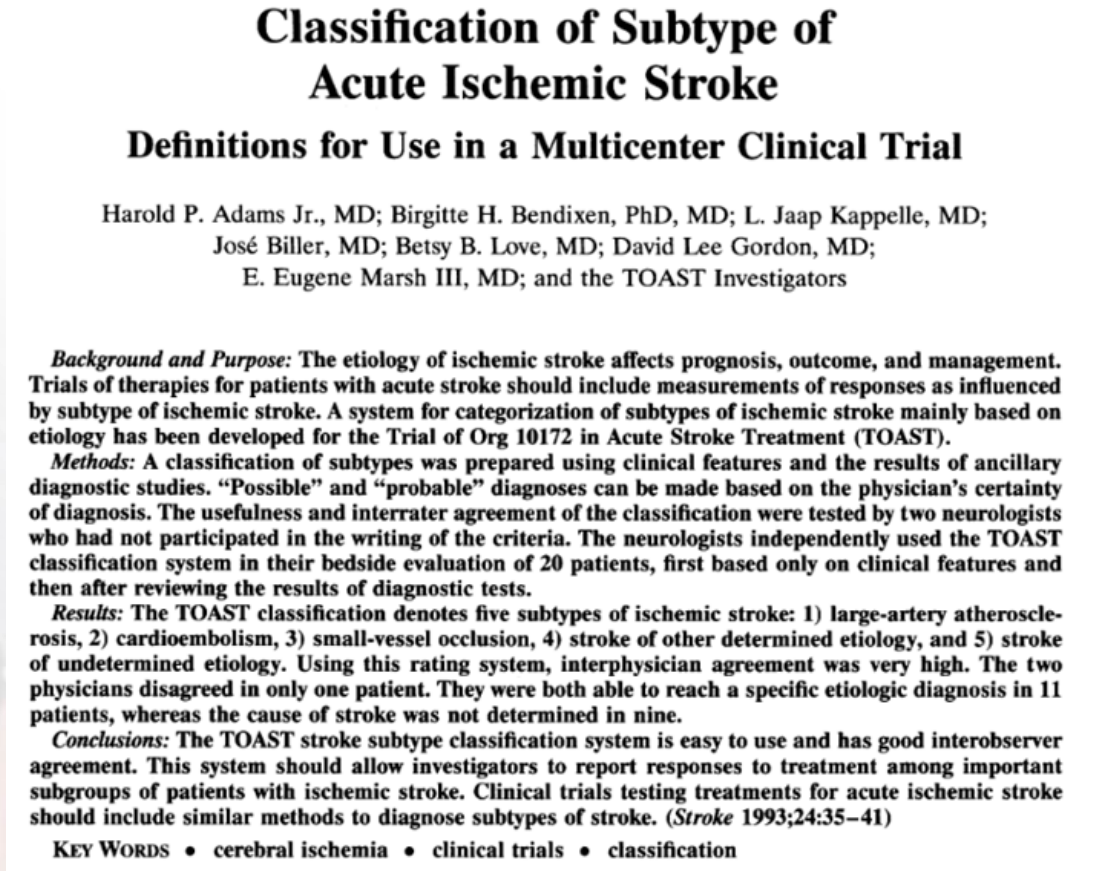
TOAST CLASSIFICATION

- Most widely used
- *Large vessel atherothrombosis*
- *Cardioembolism*
- *Small vessel disease*
- *Other determined causes*
- *Undetermined causes*

(include cases involving more than one primary mechanism)



Classification of Subtype of Acute Ischemic Stroke

Definitions for Use in a Multicenter Clinical Trial

Harold P. Adams Jr., MD; Birgitte H. Bendixen, PhD, MD; L. Jaap Kappelle, MD; José Biller, MD; Betsy B. Love, MD; David Lee Gordon, MD; E. Eugene Marsh III, MD; and the TOAST Investigators

Background and Purpose: The etiology of ischemic stroke affects prognosis, outcome, and management. Trials of therapies for patients with acute stroke should include measurements of responses as influenced by subtype of ischemic stroke. A system for categorization of subtypes of ischemic stroke mainly based on etiology has been developed for the Trial of Org 10172 in Acute Stroke Treatment (TOAST).

Methods: A classification of subtypes was prepared using clinical features and the results of ancillary diagnostic studies. "Possible" and "probable" diagnoses can be made based on the physician's certainty of diagnosis. The usefulness and interrater agreement of the classification were tested by two neurologists who had not participated in the writing of the criteria. The neurologists independently used the TOAST classification system in their bedside evaluation of 20 patients, first based only on clinical features and then after reviewing the results of diagnostic tests.

Results: The TOAST classification denotes five subtypes of ischemic stroke: 1) large-artery atherosclerosis, 2) cardioembolism, 3) small-vessel occlusion, 4) stroke of other determined etiology, and 5) stroke of undetermined etiology. Using this rating system, interphysician agreement was very high. The two physicians disagreed in only one patient. They were both able to reach a specific etiologic diagnosis in 11 patients, whereas the cause of stroke was not determined in nine.

Conclusions: The TOAST stroke subtype classification system is easy to use and has good interobserver agreement. This system should allow investigators to report responses to treatment among important subgroups of patients with ischemic stroke. Clinical trials testing treatments for acute ischemic stroke should include similar methods to diagnose subtypes of stroke. (*Stroke* 1993;24:35–41)

KEY WORDS • cerebral ischemia • clinical trials • classification

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Cryptogenic Stroke

- Cryptogenic stroke not = to ESUS
  - ESUS: clinical construct defined as:
    - Non-lacunar brain infarction without proximal arterial stenosis or cardioembolic sources with a clear indication of anticoagulation

THE LANCET
Neurology
Volume 13, Issue 4, April 2014, Pages 429-438

Personal View

Embolic strokes of undetermined source: the case for a new clinical construct

Dr Prof Robert G Hart MD [a], Prof Hans-Christoph Diener MD [b], Shelagh B Coutts MD [c], Prof J Donald Easton MD [d], Prof Christopher B Granger MD [e], Martin J O'Donnell PhD [f], Prof Ralph L Sacco MD [g], Prof Stuart J Connolly MD [h], for the Cryptogenic Stroke/ESUS International Working Group

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Stroke Prevention and Risk Stratification

Risk Factors

Modifiable

- Hypertension
- Diabetes mellitus
- Dyslipidemia
- Smoking
- Obesity

Non-Modifiable

- Age
- Sex
- Race/Ethnicity
- Family History
- Genetics

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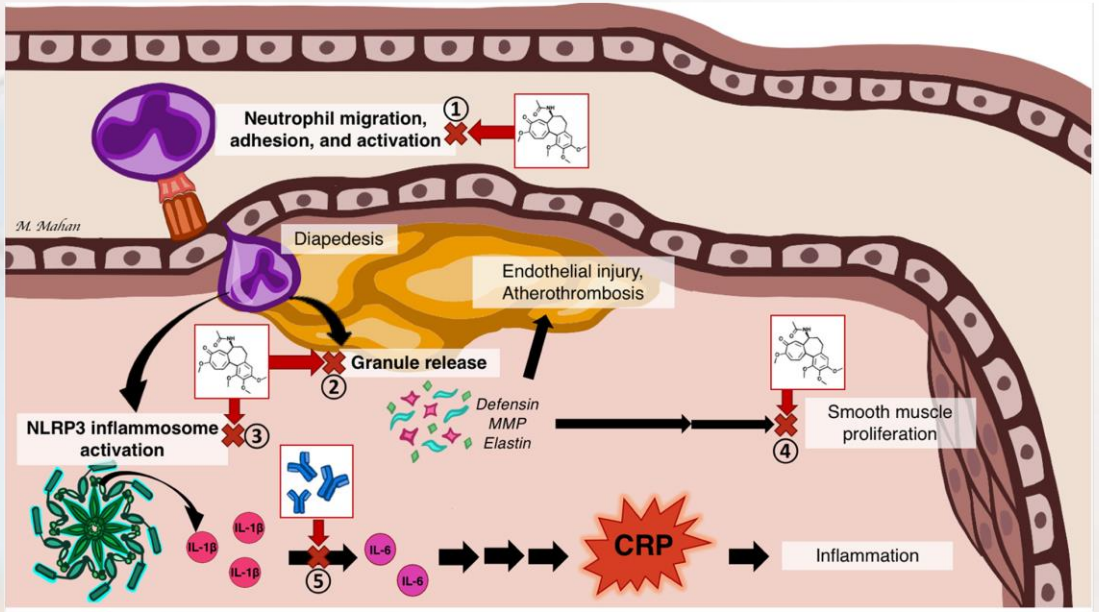
Emerging Risk Factors

- Sleep apnea
- Chronic kidney disease
- Psychosocial stressors
- Inflammation



Circulation.2022;145:6178.DOI:10.1161/CIRCULATIONAHA.121.056171

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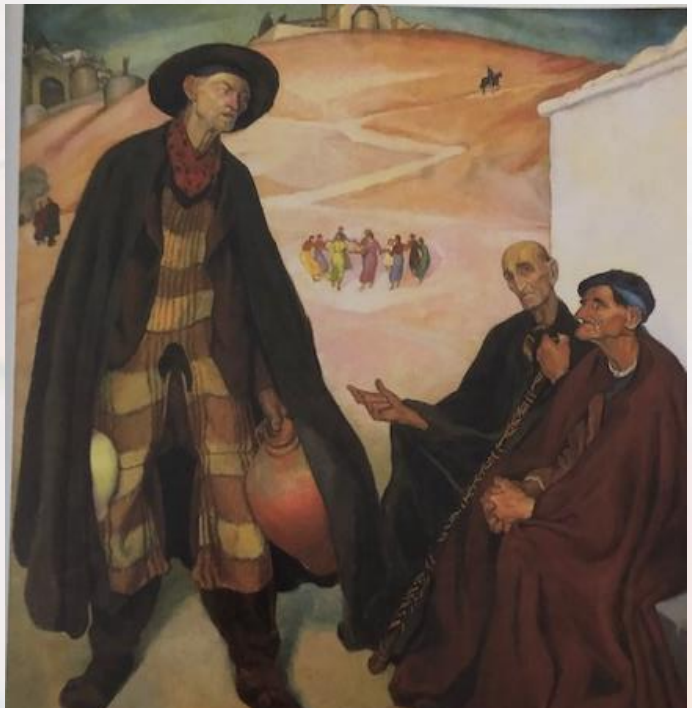
Age

- Age demographic 45-84 years – stroke incidence rates higher in men compared to women
- Trend reversed for those people 85 years of age and above



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Race/Ethnicity

- African Americans twice as likely to have a stroke as Whites; highest stroke mortality rate
- Less likely to achieve independence in ADL than Whites
- Mexican Americans: 34% greater risk of ischemic stroke compared to Whites
- Highest rate of metabolic syndrome among Hispanic women
- Higher stroke rate in Native Americans compared to Whites

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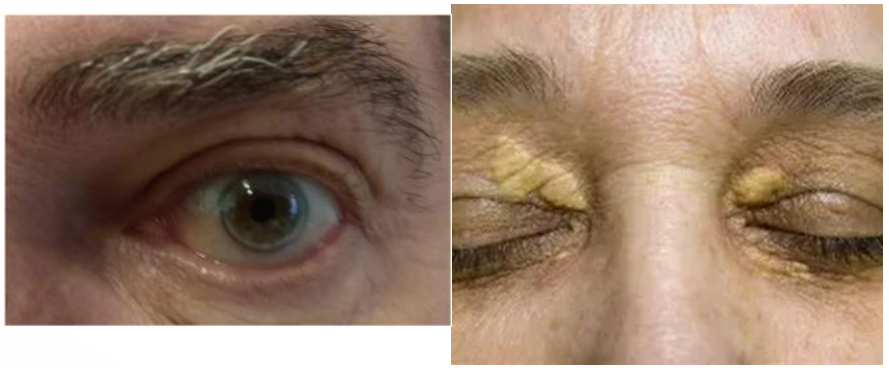
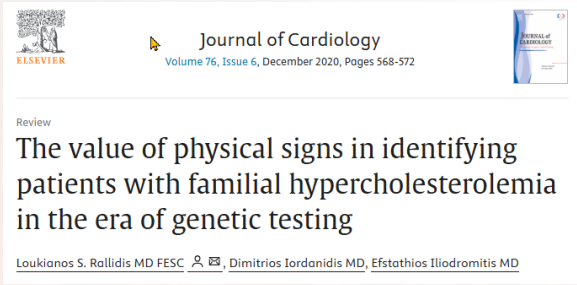
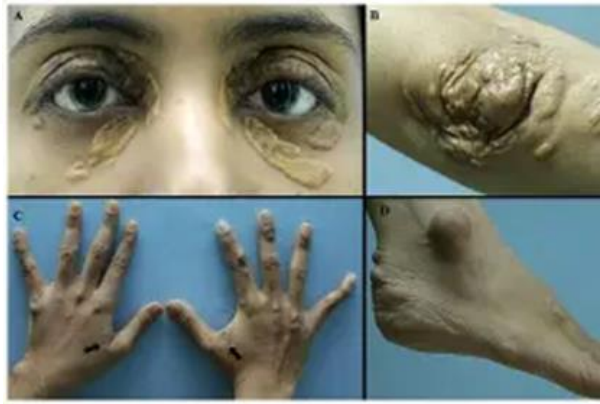
Stroke Prevention and Risk Stratification

Hereditary



- Varies with stroke subtype
- Familial Hypercholesterolemia
- ↑ Lp(a)
- Polymorphisms in the genes for adipocytokines, lipoprotein lipase and CRP
- EDS IV, Marfan syndrome, HHT, SWS
- Familial atrial myxomas
- Hereditary cardiomyopathies
- Hypercoagulable states
- Metabolic disorders (MELAS, Fabry disease, Homocystinuria)





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Hypertension

- Most important modifiable risk factor
- Stroke survivors with hypertension have a 67% higher odds of stroke recurrence
- Ambulatory BP provides more accurate data than office-based BP measurements
- Target BP < 130/80 mm Hg for most patients*

* **Normal < 120 and < 80**

J of Clinical Neurosciences. 2019; 60: 24-30

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Lifestyle modifications for all stages of hypertension including pre-hypertension

- Optimize weight
- Limiting alcohol consumption
- Participate in regular aerobic exercise
- Reduce sodium intake
- Maintain adequate intake of dietary potassium, calcium and magnesium

BP reduction more important than the specific antihypertensive agent or modality use

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Diabetes Mellitus

- Diabetes ↑ ischemic stroke risk 2-4 fold
- Independent risk factor for stroke recurrence
- Target HgbA1C < 7%
- Glucagon-like peptide 1 receptor agonists (GLP-1 RA) associated with ↓ stroke risk

J of Diabetes Investigation. 2023; 14 (4): 687-695

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Atrial Fibrillation

- 5-fold ↑ in risk of ischemic stroke
- Higher risk in non-paroxysmal AF compared to paroxysmal AF
- Stroke survivors with AF have an 88% higher odds of recurrence
- NVAF (and prior stroke/TIA) highest risk of stroke or systemic embolism

CHA2DS2-VASc validated point-based tool for predicting quantitative stroke risk in order to identify high-risk individuals who would benefit from anticoagulant therapy

Chest. 2010; 137 (2): 263-272
J of Clin Neuroscience. 2019; 60 : 24-30
Eur Stroke J. 2020; 5 (1): 155-168

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HEART HEALTH

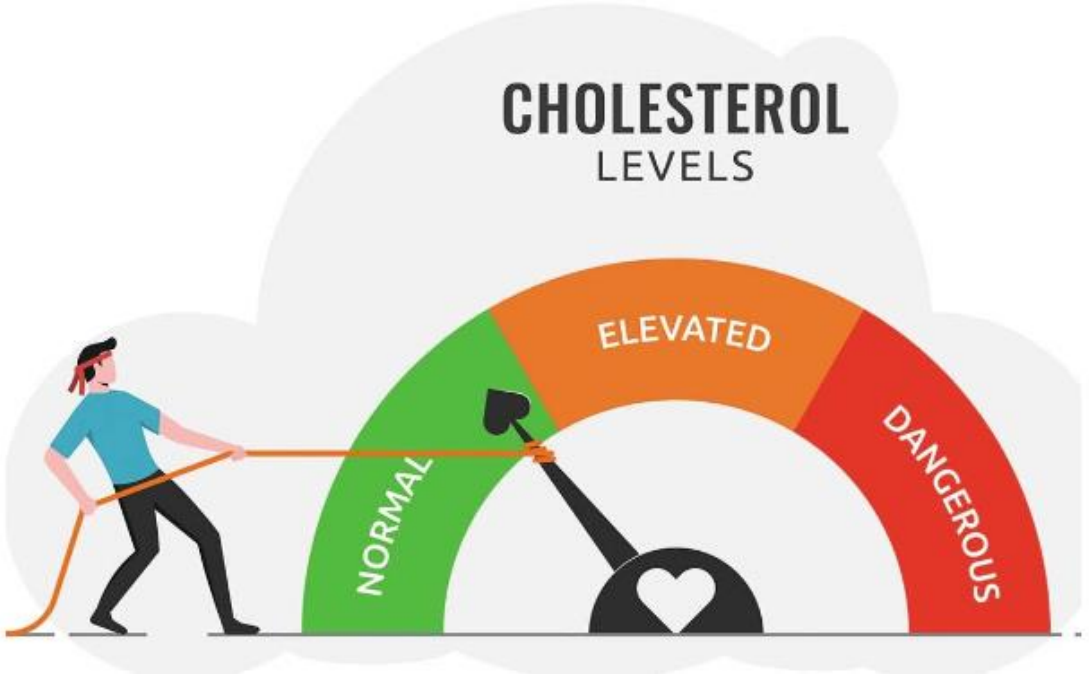
How low should LDL cholesterol go?

Your number depends on your cardiovascular risk factors.

June 1, 2024

By Matthew Solan, Executive Editor, *Harvard Men's Health Watch*

Reviewed by **Howard E. LeWine, MD**, Chief Medical Editor, Harvard Health Publishing; Editorial Advisory Board Member, Harvard Health Publishing



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Hyperlipidemia

- ↓ LDL-C through drug therapy ↓ IS risk by 20% for every 39 mg/dl ↓
- Target LDL-C < 70 mg/dL
- People with CV disease at the highest risk should aim for LDL<55 mg/dL (European guidelines)
- AHA– all patients at risk for stroke who have had an atherosclerotic cerebral infarction or TIA should be treated with statins, regardless of initial LDL-C with a goal LDL-C of < 70 mg/dL
- Ezetimibe may be added when LDL-C remains above goal
- PCSK9 inhibitors reasonable for patients who do not achieve recommended goals on maximally tolerated statin following addition of ezetimibe
- PCSK9 inhibitors ↓ levels of both LDL-C and Lp(a)
- Low serum HDL-C risk factor for coronary artery disease
- ↑ levels of HDL-C offer protective benefit against cerebral SVD
- Niacin can provide a safe and effective therapy for rising HDL-C

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Lipoprotein(a) and Stroke

- *Pro-atherogenic, Prothrombotic, and Antifibrinolytic*
- *Independent and causal risk factor for atherosclerotic CVD including patients with DM*
- *↑ Lp(a) levels predictive marker for identifying individuals at risk of developing large artery atherosclerotic IS and ICH*
- *Lp(a)levels not affected by lifestyle interventions*
- *Niacin, lipoprotein apheresis, PCSK9 inhibitors*
- Lowering LDL-C < 55 mg/dL with high intensity statin therapy
- For stroke patients with LDL-C > 55 mg/dL despite maximally tolerated statin therapy with Lp(a) levels > 125 nmol/L, consider PCSK9 inhibitors
- For patients with LDL-C >55 mg/dl, Lp(a) > 125 nmol/L, and LDL-C < 25% above target, ezetimibe is an option

Arterioscler Thromb Vasc Biol. 2022; 42: e48-e60
Use Fig – page e49
Scientific Reports. 2021; 11: 15660
JACC Advances 2023; vol 2. Number 7

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Smoking

- Independent risk factor for ischemic stroke among men and women of all ages
- >5 years may be required before a ↓ in stroke risk is observed following smoking cessation

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Substance Abuse

- 2021 National Survey on Drug Use and Health: > 4.8 million people ≥ 12 years of age used cocaine in the past year, with almost 1 million using crack

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J of Cardiovascular Pharmacology and Therapeutics. 2017; 22 (3): 239-249

Hormone Replacement Therapy

- Low quality of evidence suggests against the use of HRT to ↓ stroke risk in postmenopausal women
- No data on outcomes for women with stroke when treated with HRT
- *Pregnant women can be treated with IV thrombolysis after assessing the benefit/risk profile on an individual basis*
- *Pregnant women with AIS and LVO, can be treated with MT after appropriate assessment of the benefit/risk profile*

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Sedentary Lifestyle

- Strong association between physical inactivity and ↑ risk of stroke
- Regular exercise ↓ BP, ↓ insulin resistance, increases HDL-C, ↓ fibrinogen levels, associated with ↓ cardiovascular M/M

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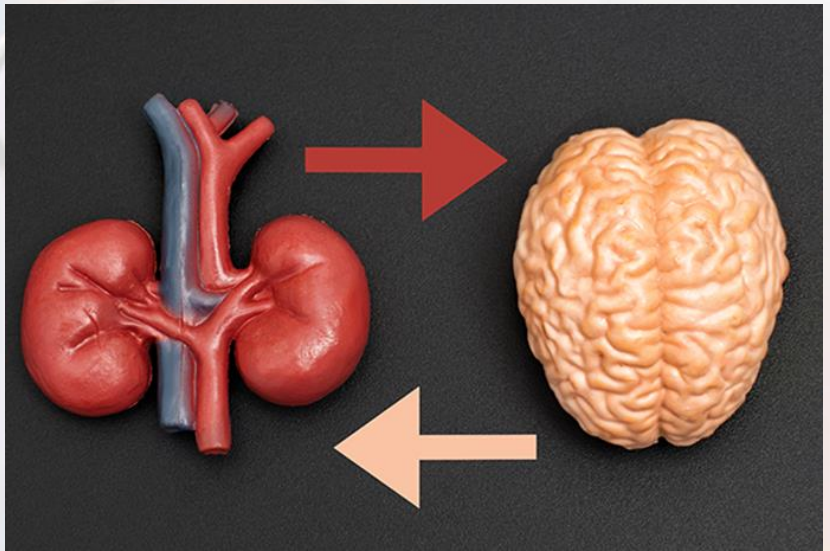
Kidney Disease

- Risk of stroke ↑ 7% for every 10 mL/min/1.73 m^2
- eGFR decrement
- eGFR ↓ 45 mL/min/1.73 m^2
- ↑ risk of cardioembolic strokes and unfavorable outcomes



Int J Stroke. 2020; 15 (11): 29-38

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Stroke Prevention and Risk Stratification

Alcohol

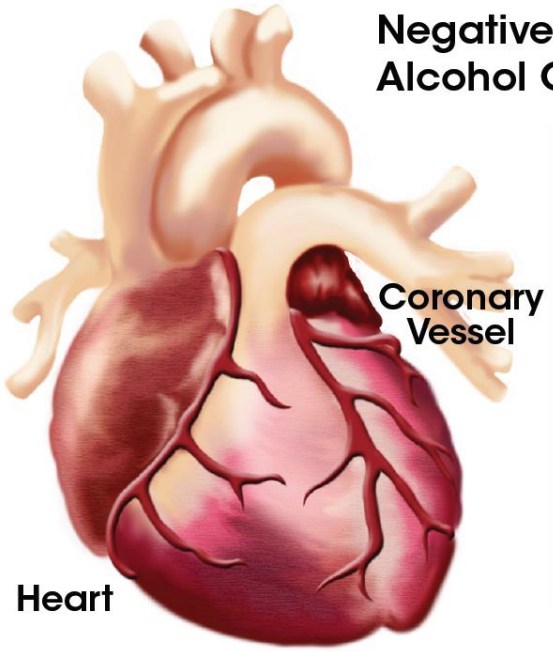
Cardioprotective Effects of Low-to-Moderate Alcohol Consumption

Brain

Protective Potential Mechanisms

- ↑ HDL (Alcohol may alter synthesis or clearance or affect enzymes involved in metabolism)
- ↑ A-I and A-II apolipoprotein
- ↓ Levels of oxidized LDL-c
- ↓ CRP and fibrinogen levels
- ↓ Platelet reactivity and aggregability
- ↓ Prevalence of Type 2 diabetes mellitus
- ↑ Insulin sensitivity

Negative Effects of Increased Alcohol Consumption



Coronary Vessel

Heart

- Hypertension and transient ↑ in BP
- Endothelial dysfunction
- Oxidative stress
- ↑ Platelet activation (via ↑ in inositol 1,4,5 triphosphate and ↑ intracellular Ca^{2+}) and rebound thrombocytosis
- ↑ PAI-1 → ↓ fibrinolysis → ↑ thrombus

Cardiomyocytes

- ↑ Beneficial effects of ischemic preconditioning
- Attenuates adverse cellular effects of ischemia/reperfusion injury, reducing myocardial infarction size and cell death

Even small amounts of alcohol can increase BP (2025 AHA/ACC Hypertension Guidelines)

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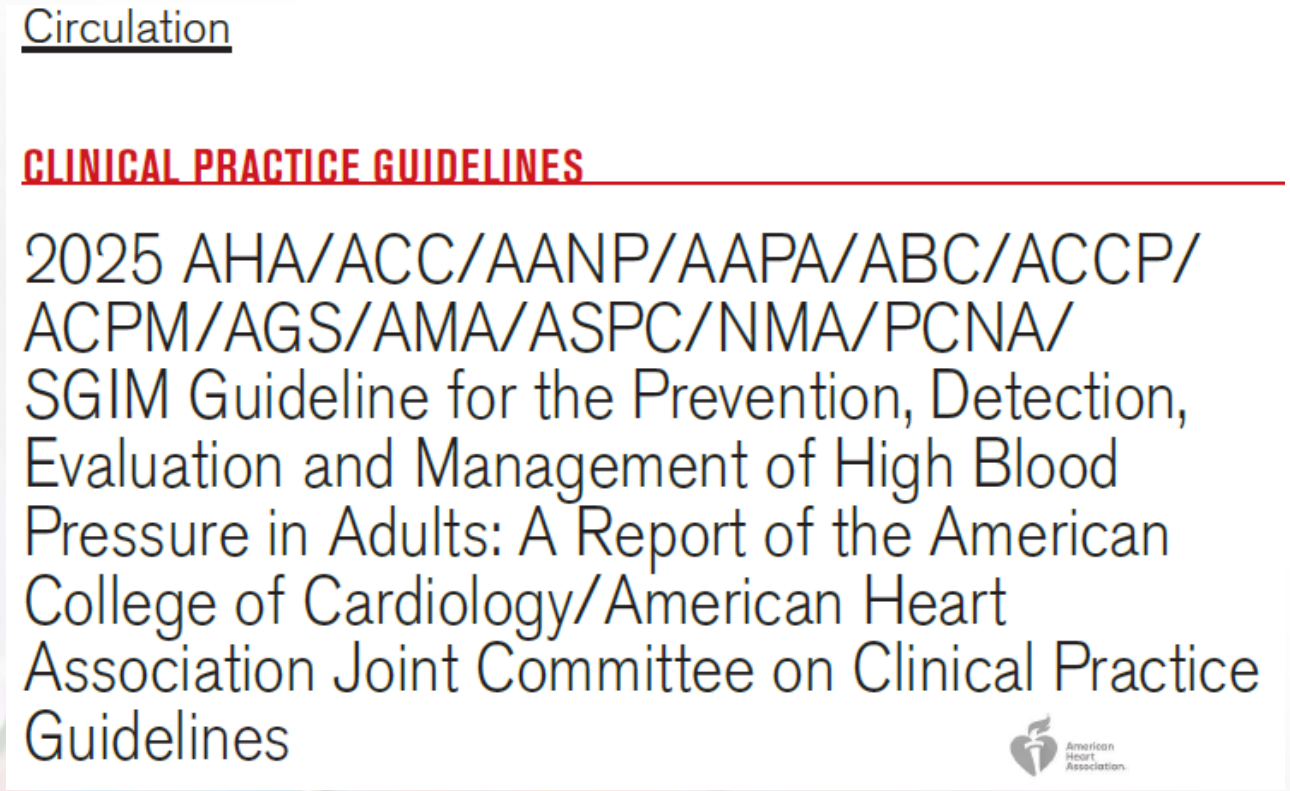

The guidelines recommend that adults with or without high blood pressure should aim for abstinence from alcohol to prevent or treat elevated BP or at least reduce intake to no more than one drink per day for women and two drinks per day for men. The new guidelines emphasize that even small amounts of alcohol can increase blood pressure, so avoiding alcohol is the ideal goal.

Stroke Prevention and Risk Stratification

Sleep Disordered Breathing (SDB)

- Abnormal circadian BP variations during sleep are associated with WMHs
  - Non-dipping (< 10% fall in nocturnal BP)
  - Reverse dipping patterns (rise in nocturnal BP
- OSA may be associated with more WHMs and silent lacunar infarcts

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Int J Stroke. 2020; 15 (8): 923-929

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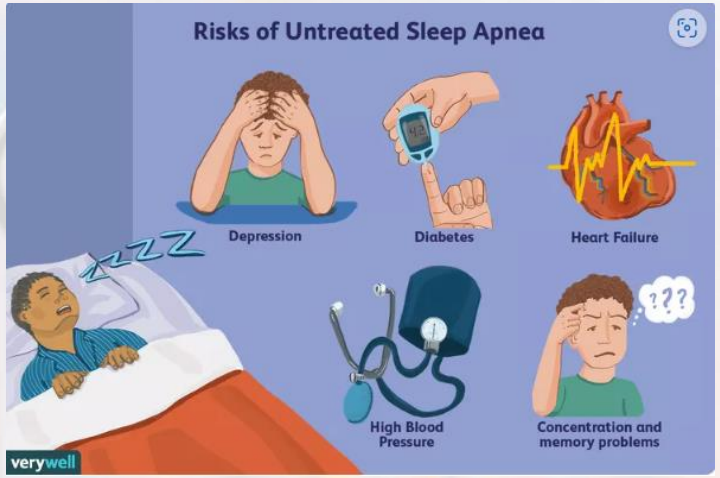
Sleep Disordered Breathing (SBD)

- SDB, particularly OSA risk factor for stroke and hypertension
- Severe OSA associated with a 2-fold ↑ in stroke risk
- Bi-directional link between OSA and AF
- 20% to 40% of patients with OSA are not obese



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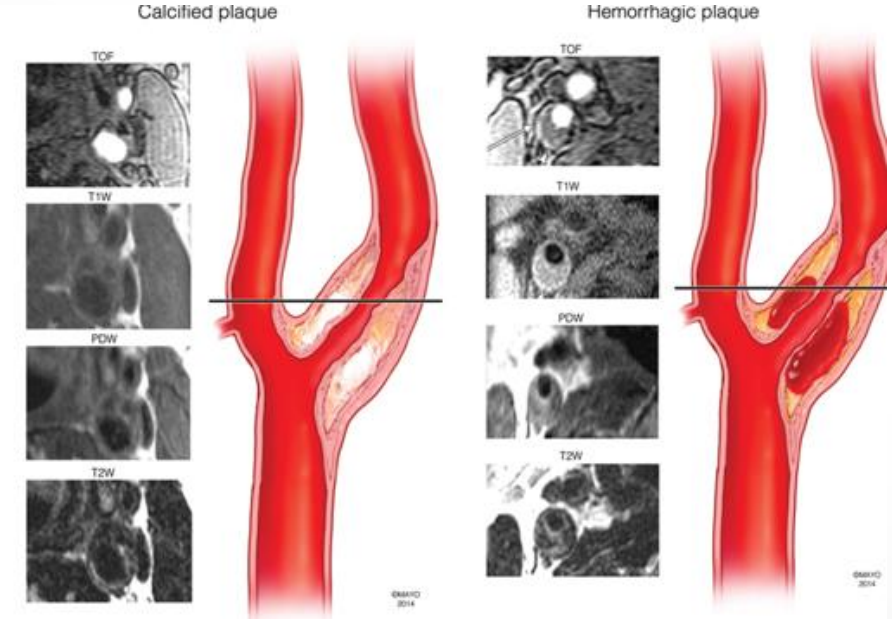
Int J Stroke. 2020; 15 (8): 923-929

Stroke Prevention and Risk Stratification

Carotid Atherosclerosis

- Plaque structure rather than degree of carotid artery stenosis maybe a more relevant factor in determining stroke risk
- Intraplaque hemorrhage, plaque ulceration, neovascularization, and fibrous cap thinning indicative of high-risk atherosclerotic plaques

No indication for screening of asymptomatic carotid artery stenosis in the general population



J of Neurosurgery. 2016; 124 (1): 27-42

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Carotid Atherosclerosis

- *Prior concept of absence of hemodynamically significant luminal diameter stenosis (≥70%) detected by DSA, CTA, MRA, or US presumably ruling out symptomatic atherosclerotic disease is no longer valid*

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Transient Ischemic Attacks

- 1.2% cumulative risk of stroke 2 days post-TIA; 7.4% within 90 days
- ABCD2 scores of 4 or greater indicate moderate-to-high stroke risk

Table 1. ABCD² score.

Patient characteristic	Points
Age	1
Blood pressure (systolic ≥140 mmHg or diastolic ≥90 mmHg)	1
Clinical	
Focal weakness	2
Isolated speech difficulties	1
Duration	
≥60 min	2
10–59 min	1
Diabetes	1

Table 2. Interpretation of ABCD² score.

Points	2-day stroke risk (%)
≤1	0
2–3	1.3
4–5	4.1
6–7	8.1

F Chaudhry, J Biller, M Flaster. Commonly asked questions in transient ischemic attack. Expert Rev Neurother. 2013;13(2)

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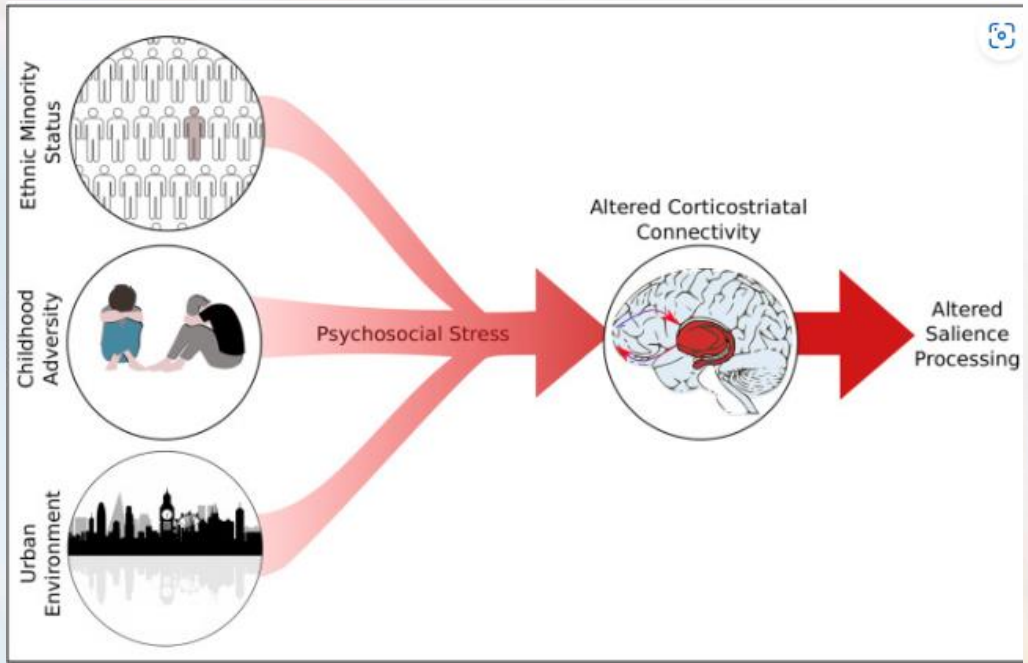
Psychosocial

- Psychosocial distress doubles the odds of stroke
- Chronic stress ↑ sympathetic nervous system activity and cortisol levels leading to endothelial dysfunction ↑ BP, ↑ platelet aggregation, and heightened stroke risk



Schizophrenia Research
Volume 213, November 2019, Pages 56-64

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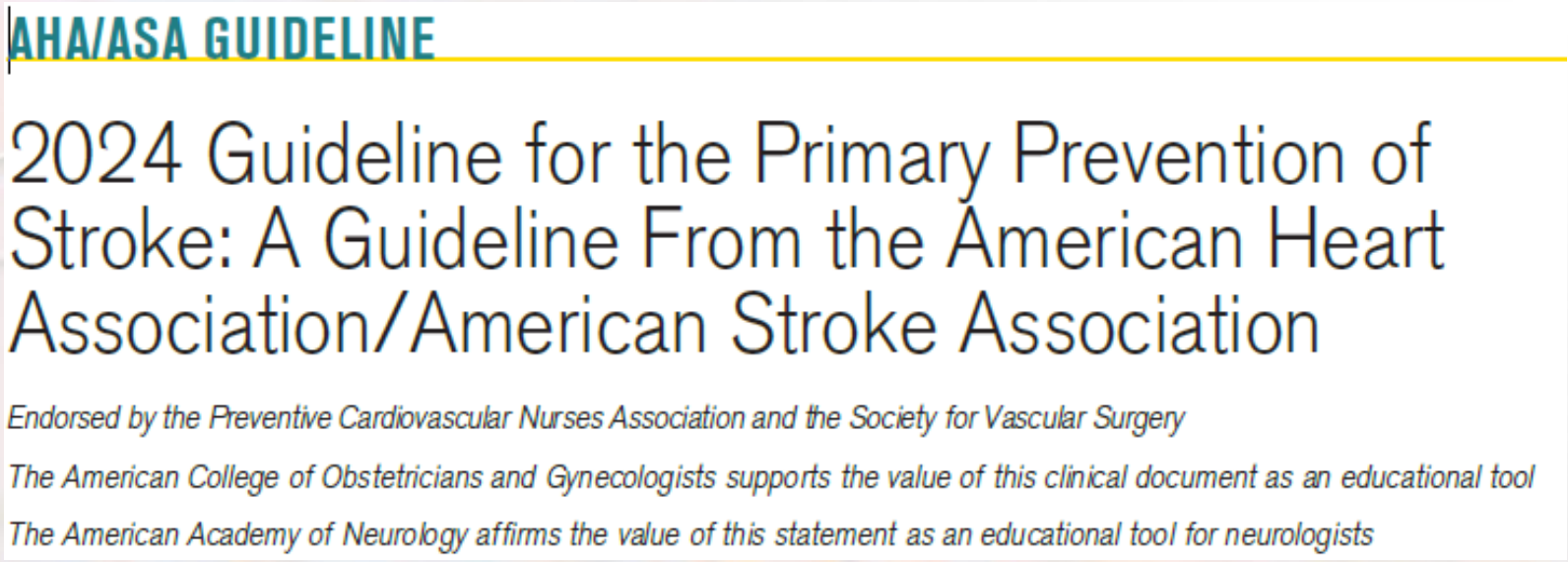
Stroke Prevention and Risk Stratification

Antithrombotic Therapy

Primary Prevention

No indication for low-dose aspirin in patients over 60 years of age for primary prevention of atherosclerotic atherosclerotic cardiovascular disease.



JAMA. 2022; 327 (16): 1585-1597

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Stroke Prevention and Risk Stratification

Antithrombotic Therapy
Secondary Prevention

- Antiplatelets key component of secondary stroke prevention
- Aspirin ↓ RR of stroke, MI, and vascular death by approximately 25%
- Optimal dose ranges from 50 to 325 mg daily; lower doses associated with fewer GI side effects
- Clopidogrel often used as an alternative to aspirin
- Clopidogrel 75 mg daily slightly more effective than aspirin (325 mg daily) in ↓ risk of ischemic stroke, MI and vascular death (8.7% RRR)

Lancet. 1996; 348 (9038). 1329-1339
BMJ. 2002; 324: 71-86
N Engl J Med. 2013; 369(1): 11-1
N Engl J Med. 2018; 379(3): 215-225

Stroke Prevention and Risk Stratification

Antithrombotic Therapy
Secondary Prevention

- DAPT (aspirin + clopidogrel) recommended for short term use in specific high-risk situations
- Clopidogrel resistance (variants of CYP2C19 gene)*
- Combination of clopidogrel and aspirin ↑ risk of bleeding
- Ticagrelor plus aspirin superior to aspirin alone in preventing stroke recurrence
- Dipyridamole + with aspirin another option for secondary stroke prevention

***tests are available to identify individuals who are CYP2C19 poor metabolizers**

Lancet. 1996; 348 (9038). 1329-1339
BMJ. 2002; 324: 71-86
N Engl J Med. 2013; 369(1): 11-1
N Engl J Med. 2018; 379(3): 215-225

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Stroke Prevention and Risk Stratification

Dual Antiplatelet Therapy (DAPT)

- Aspirin + clopidogrel administered early within24 hours and continued short term for 21-90 days for non-embolic minor stroke (NIHSS ≤3), or high-risk TIA(ABCD2 score ≥4) shown to be more effective than single antiplatelet therapy in ↓ risk of recurrent stroke
- Ticagrelor + aspirin under similar circumstances demonstrated a lower rate of recurrent stroke and death in comparison to aspirin monotherapy, **BUT** with ↑risk of severe bleeding
- Aspirin alone preferable to DAPT with aspirin and clopidogrel in long-term secondary prevention in small vessel disease (SVD)

Block HS, Biller J. Ischemic Cerebrovascular Disease, Chapter 41. In: J Biller (Ed). Practical Neurology. 6th ed. Wolters Kluwer. In Press

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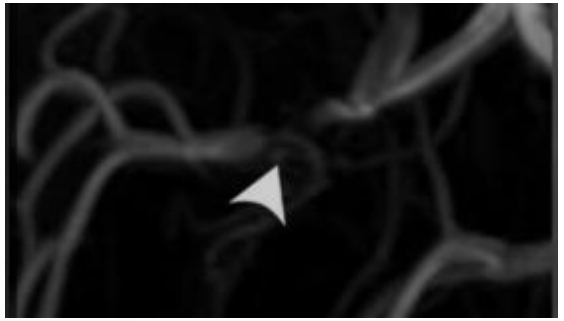
Stroke Prevention and Risk Stratification

Dual Antiplatelet Therapy (DAPT)

- In symptomatic intracranial atherosclerosis, DAPT for 90 days plus intensive medical management (IMM) superior to intracranial Wingspan stent placement plus DAPT + IMM. The latter significantly ↑ risk of ICH and all-cause mortality within 30 days
- Late and long-term DAPT weeks to months after index stroke and prolonged use > 90 days IS NOT advised (no significant stroke risk reduction in comparison to aspirin monotherapy, and substantially ↑risk of hemorrhagic complications)



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Guideline

EUROPEAN STROKE JOURNAL

European Stroke Journal
2022, Vol. 7(3) XLII–LXXX

DOI: 10.1177/23969873221099715
journals.sagepub.com/home/eso
SAGE

European Stroke Organisation guidelines on treatment of patients with intracranial atherosclerotic disease

Marios Psychogios[1], Alex Brehm[1], Elena López-Cancio[2], Gian Marco De Marchis[3], Elena Meseguer[4], Aristeidis H Katsanos[5], Christine Kremer[6], Peter Sporns[1,7], Marialuisa Zedde[8,9], Adam Kobayashi[10,11], Jildaz Caroff[12], Daniel Bos[13,14], Sabrina Lémeret[15], Avtar Lal[15] and Juan F Arenillas[16,17]

Abstract

The aim of the present European Stroke Organisation guideline is to provide clinically useful evidence-based recommendations on the management of patients with intracranial atherosclerotic disease (ICAD). The guidelines were prepared following the Standard Operational Procedure of the European Stroke Organisation guidelines and according to GRADE methodology. ICAD represents a major cause of ischemic stroke worldwide, and patients affected by this condition are exposed to a high risk for future strokes and other major cardiovascular events, despite best medical therapy available. We identified 11 relevant clinical problems affecting ICAD patients and formulated the corresponding Population Intervention Comparator Outcomes (PICO) questions. The first two questions refer to the asymptomatic stage of the disease, which is being increasingly detected thanks to the routine use of noninvasive vascular imaging. We were not able to provide evidence-based recommendations regarding the optimal detection strategy and management of asymptomatic ICAD, and further research in the field is encouraged as subclinical ICAD may represent a big opportunity to improve primary stroke prevention. The second block of PICOs (3–5) is dedicated to the management of acute large vessel occlusion (LVO) ischemic stroke caused by ICAD, a clinical presentation of this disease that is becoming increasingly relevant and problematic, since it is associated with more refractory endovascular reperfusion procedures. An operational definition of probable ICAD-related LVO is proposed in the guideline. Despite the challenging context,

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Oral Anticoagulant Therapy

- For patients with AF, anticoagulant therapy crucial to ↓ risk of cardioembolic stroke
- DOACs preferably than warfarin
- No data to support use of DOACs over warfarin in stroke patients with mechanical heart valves
- In NVAF: RRR = 68% with warfarin (21% with aspirin)
- Patients who cannot tolerate DOACs or maintain a therapeutic INR with warfarin, LAA closure (WATCHMAN, Lariat)
- No indication for warfarin in intracranial atherosclerotic disease

J Am Coll Cardiol. 2009; 54(22): 2080-2089
J Am Coll Cardiol. 2014; 64(6): 565-572

Stroke Prevention and Risk Stratification

Anticoagulants (cont)

- No indication for warfarin in symptomatic intracranial atherosclerotic disease
- Antithrombotic treatment choice for APS and for recurrent ischemic stroke felt secondary to malignancy-related hypercoagulabilty
- Within the first 3 months after an extracranial carotid or vertebral artery dissection, either aspirin or warfarin may be used

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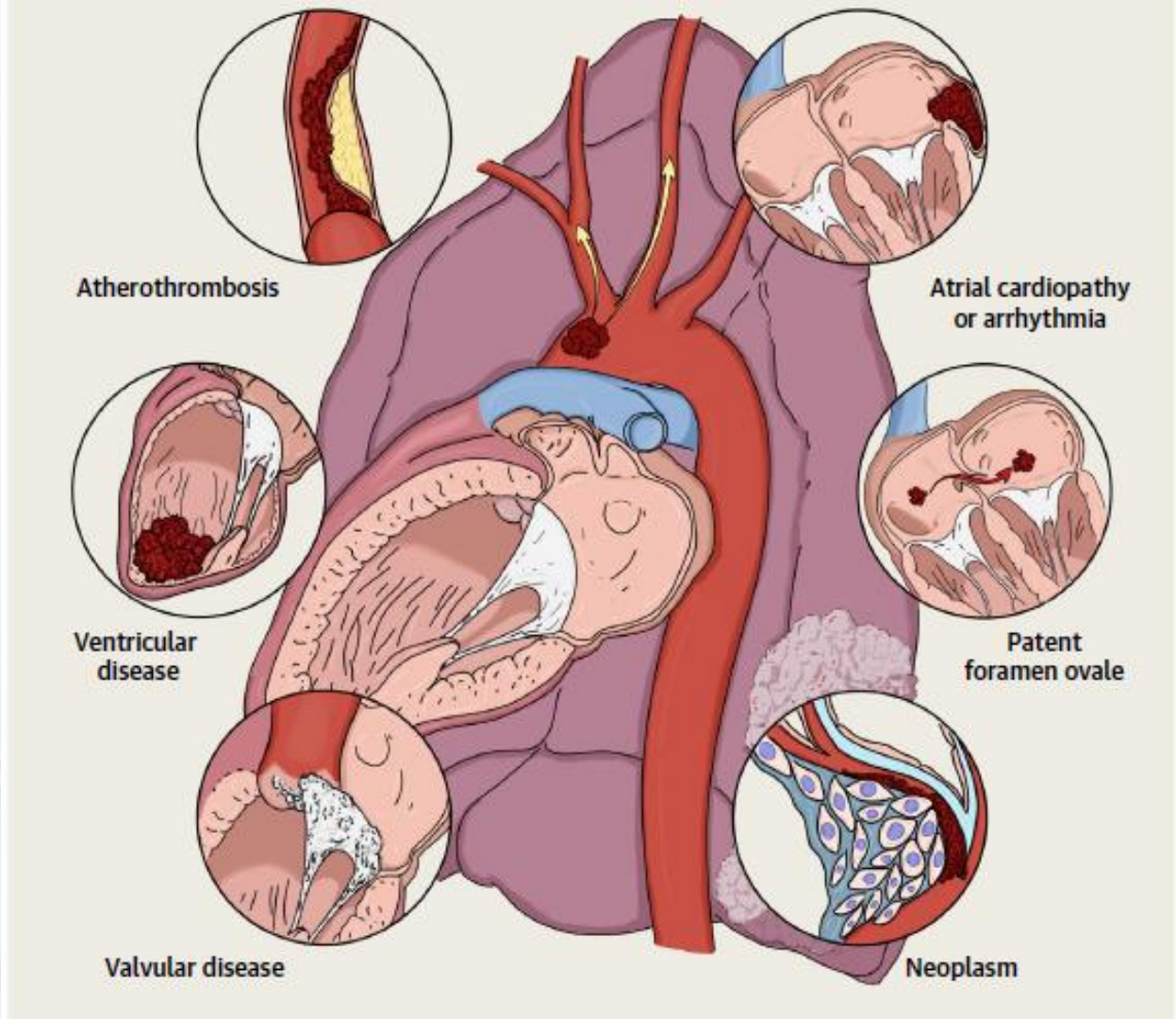
ESUS



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JACC. 2023;82 (15):1539-1557

ESUS

Oral Anticoagulant Therapy

- NAVIGATE-ESUS (Rivaroxaban vs Aspirin)
- RESPECT-ESUS (Dabigatran vs Aspirin)
- ATTICUS (Apixaban vs Aspirin)
- ***No benefit of DOACs over aspirin in unselected ESUS populations***

J Am Coll Cardiol. 2009; 54(22): 2080-2089
J Am Coll Cardiol. 2014; 64(6): 565-572

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Cryptogenic Strokes and Atrial Cardiopathy

Oral Anticoagulant Therapy

ARCADIA

- Cryptogenic strokes and evidence of atrial cardiopathy without AF
- **Apixaban did not significantly ↓ recurrent stroke compared to aspirin**

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JAMA. 2024; 331 (7); 573-581

Atrial Fibrillation

- For patients with AF and an estimated annual thromboembolic risk of ≥ 2% per year (eg, CHA2DS2-VASc score ≥ 2 in men and ≥3 in women) anticoagulation is recommended to prevent stroke and systemic thromboembolism (COR 1/LOE A)
- In patients with AF who do not have a history of moderate to severe rheumatic mitral stenosis or a mechanical heart valve, and who are candidates for anticoagulation, DOACs are recommended over warfarin to reduce the risk of mortality, stroke, and systemic embolism and ICH (COR 1/LOE A)
- For patients with AF and an estimated annual thromboembolic risk of ≥ 1% but < 2% per year(equivalent to CHA2DS2-VASc score of 1 in men and 2 in women) anticoagulation is reasonable to prevent stroke and systemic thromboembolism (COR 2a/LOE A)
- In patient with AF who are candidates for anticoagulation and without an indication for antiplatelet therapy, aspirin either alone or in combination with clopidogrel as an alternative to anticoagulation is not recommended to reduce stroke risk (COR 3 Harm/LOE B-R)
- In patients with AF without risk factors for stroke, aspirin monotherapy for prevention of thromboembolic events is of no benefit (COR 3: No Benefit/LOE B-NR)

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Stroke Prevention and Risk Stratification

Antithrombotic Therapy

Miscellaneous

- ***Cilostazol*** – commonly used in the Asia-Pacific region
  - Weak antiplatelet
  - Endothelial stabilization
  - Myelin repair
  - Neuroprotective
  - Anti-inflammatory

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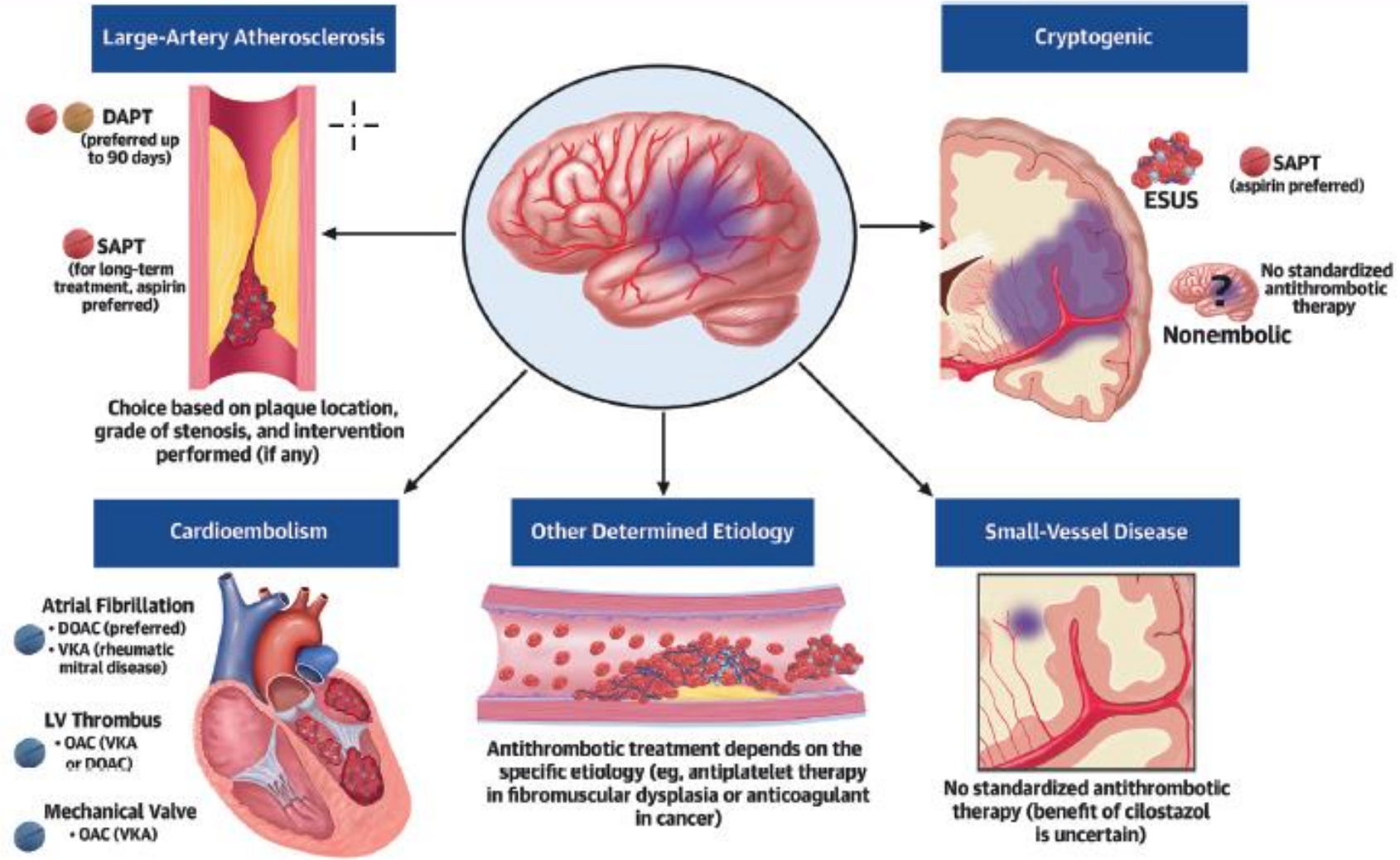
CENTRAL ILLUSTRATION Types of Ischemic Strokes and Recommended Antithrombotic Strategies



Greco A, et al. J Am Coll Cardiol. 2023;82(15):1538-1557.

Ischemic strokes are classified into five etiological subtypes according to the TOAST (Trial of Org 10172 in Acute Stroke Treatment) classification, including strokes from cardioembolic events (approximately 27%), large-artery atherosclerosis (approximately 13%), or small-vessel disease (approximately 23%), with strokes of other

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Stroke Prevention and Risk Stratification

Secondary Stroke Prevention

- Blood Pressure: Target BP < 130/80 mm Hg

NORMAL	LESS THAN 120	and	LESS THAN 80

- Antiplatelet therapy:
  - POINT/minor stroke or high-risk TIA: aspirin 50-325 mg and clopidogrel 75 mg followed by initial loading dose of aspirin 50-325 mg and clopidogrel 600 mg
  - THALES/mild-moderate acute non-cardioembolic stroke or a high-risk of a TIA : aspirin 75-100 mg and ticagrelor 90 mg twice per day followed by initial dose of aspirin 300-325 mg and ticagrelor 180 mg
  - DLP: atorvastatin 40-80 mg or rosuvastatin 20-40 mg +/- ezetimibe with target LDL < 70 mg/dL(<55mg/dL)
- If with maximal statin and ezetimibe therapy, LDL > 70 mg/dL(>55 mg/dL) - PCSK9 inhibitor

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Secondary Stroke Prevention

- Diabetes mellitus: A1C ≤ 7
- Smoking cessation: Counseling with or without drug therapy (nicotine replacement, bupropion, or varenicline)
- Obesity: Behavioral lifestyle-modification program
- Diet: Mediterranean/DASH or other heart healthy diets
- OSA: Positive airway pressure

GLP-1, SGLT2 medications may lower stroke survivor's risk of future heart attack, stroke

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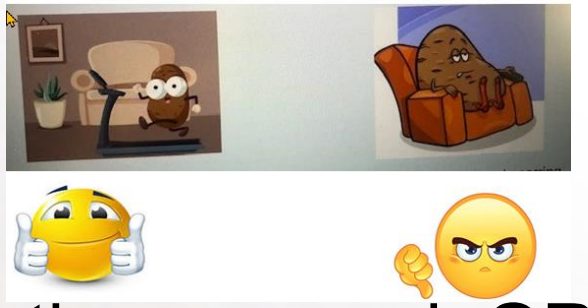
Take Home Messages

- Control of modifiable RFs
- Antiplatelet therapy: Aspirin 81 mg daily or Clopidogrel 75 mg daily
- BP management: Regularly monitoring with a BP goal of < 130/80 mm Hg NORMAL | LESS THAN 120 | and | LESS THAN 80
- Glycemic control: Monitor and maintain Hemoglobin A1C < 7.0%
- Statin therapy: High intensity atorvastatin therapy 80 mg or rosuvastatin 20mg; maintain LDL-C ≤ 70 mg/dL(<55 mg/dL for people with CV disease at the highest risk)
- Low sodium, potassium rich, heart-healthy diet
- Avoid alcohol or tobacco consumption



- ~ 10 min of moderate-intensity aerobic exercises 4 times a week **OR** 20 minutes of vigorous-intensity aerobic exercise bi-weekly

Periodontal Disease and Atherosclerotic Cardiovascular Disease

Published: December 16, 2025

- Atherosclerotic cardiovascular disease (ASCVD) remains the leading cause of death globally; in the U.S., it accounts for more deaths annually than cancer and chronic lower respiratory diseases combined.
- A 2012 AHA scientific statement concluded that periodontal disease is associated with ASCVD but called for more robust evidence on clinical outcomes and treatment effects.
- This updated statement builds on prior evidence, highlighting new data supporting an association between periodontal disease and ASCVD, while emphasizing potential mechanisms and gaps.

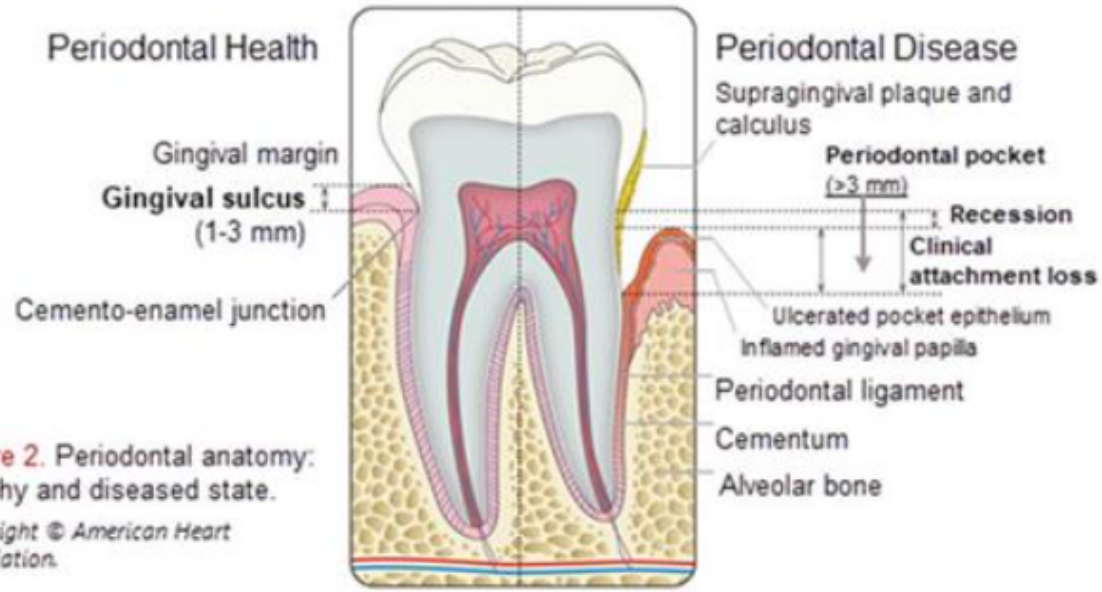


Figure 2. Periodontal anatomy: healthy and diseased state.

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The End

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Questions