

Guidelines for Prevention of Stroke in Patients With Ischemic Stroke or Transient Ischemic Attack

A Statement for Healthcare Professionals From the American Heart Association/American Stroke Association Council on Stroke

Co-Sponsored by the Council on Cardiovascular Radiology and Intervention

The American Academy of Neurology affirms the value of this guideline.

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Abstract—The aim of this new statement is to provide comprehensive and timely evidence-based recommendations on the prevention of ischemic stroke among survivors of ischemic stroke or transient ischemic attack. Evidence-based recommendations are included for the control of risk factors, interventional approaches for atherosclerotic disease, antithrombotic treatments for cardioembolism, and the use of antiplatelet agents for noncardioembolic stroke. Further recommendations are provided for the prevention of recurrent stroke in a variety of other specific circumstances, including arterial dissections; patent foramen ovale; hyperhomocysteinemia; hypercoagulable states; sickle cell disease; cerebral venous sinus thrombosis; stroke among women, particularly with regard to pregnancy and the use of postmenopausal hormones; the use of anticoagulation after cerebral hemorrhage; and special approaches for the implementation of guidelines and their use in high-risk populations. (*Circulation*. 2006;113:e409-e449.)

Key Words: AHA Scientific Statements ■ ischemia ■ ischemia attack, transient ■ stroke

Survivors of a transient ischemic attack (TIA) or stroke have an increased risk of another stroke, which is a major source of increased mortality and morbidity. Among the estimated 700 000 people with stroke in the United States each year, 200 000 of them are among persons with a recurrent stroke. The number of people with TIA, and therefore at risk for stroke, is estimated to be much greater. Epidemi-

ological studies have helped to identify the risk and determinants of recurrent stroke, and clinical trials have provided the data to generate evidence-based recommendations to reduce this risk. Prior statements from the American Heart Association (AHA) have dealt with primary¹ and secondary stroke prevention.^{2,3} Because most strokes are cerebral infarcts, these recommendations focus

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TABLE 7. Recommendations for Stroke Patients With Other Specific Conditions

Risk Factor	Recommendation	Class/Level of Evidence*
Arterial dissection	For patients with ischemic stroke or TIA and arterial dissection, warfarin for 3 to 6 mo or antiplatelet agents are reasonable.	Class IIa, Level B
	Beyond 3 to 6 mo, long-term antiplatelet therapy is reasonable for most ischemic stroke or TIA patients. Anticoagulant therapy beyond 3 to 6 mo may be considered among patients with recurrent ischemic events.	Class IIb, Level C
	For patients who have definite recurrent ischemic events despite antithrombotic therapy, endovascular therapy (stenting) may be considered.	Class IIb, Level C
	Patients who fail or are not candidates for endovascular therapy may be considered for surgical treatment.	Class IIb, Level C
Patent foramen ovale	For patients with an ischemic stroke or TIA and a PFO, antiplatelet therapy is reasonable to prevent a recurrent event.	Class IIa, Level B
	Warfarin is reasonable for high-risk patients who have other indications for oral anticoagulation such as those with an underlying hypercoagulable state or evidence of venous thrombosis.	Class IIa, Level C
	Insufficient data exist to make a recommendation about PFO closure in patients with a first stroke and a PFO. PFO closure may be considered for patients with recurrent cryptogenic stroke despite medical therapy.	Class IIb, Level C
Hyperhomocysteinemia	For patients with an ischemic stroke or TIA and hyperhomocysteinemia (levels $>10 \mu\text{mol/L}$), daily standard multivitamin preparations are reasonable to reduce the level of homocysteine, given their safety and low cost. However, there is no evidence that reducing homocysteine levels will lead to a reduction of stroke occurrence.	Class I, Level A
Hypercoagulable states		
Inherited thrombophilias	Patients with an ischemic stroke or TIA with an established inherited thrombophilia should be evaluated for deep venous thrombosis, which is an indication for short- or long-term anticoagulant therapy, depending on the clinical and hematologic circumstances.	Class IIa, Level A
	Patients should be fully evaluated for alternative mechanisms of stroke.	Class IIa, Level C
	In the absence of venous thrombosis, long-term anticoagulation or antiplatelet therapy is reasonable.	
	Patients with a history of recurrent thrombotic events may be considered for long-term anticoagulation.	Class IIb, Level C
Antiphospholipid antibody syndrome	For cases of cryptogenic ischemic stroke or TIA and positive APL antibodies, antiplatelet therapy is reasonable.	Class IIa, Level B
	For patients with ischemic stroke or TIA who meet the criteria for the APL antibody syndrome with venous and arterial occlusive disease in multiple organs, miscarriages, and livedo reticularis, oral anticoagulation with a target INR of 2 to 3 is reasonable.	Class IIa, Level B
Sickle-cell disease	For adults with SCD and ischemic stroke or TIA, general treatment recommendations cited above are applicable with regard to the control of risk factors and use of antiplatelet agents.	Class IIa, Level B
	Additional therapies that may be added include regular blood transfusion to reduce Hb S to $<30\%$ to 50% of total Hb, hydroxyurea, or bypass surgery in cases of advanced occlusive disease.	Class IIb, Level C
Cerebral venous sinus thrombosis	For patients with cerebral venous sinus thrombosis, UFH or LMWH is reasonable even in the presence of hemorrhagic infarction.	Class IIa, Level B
	Continuation of anticoagulation with an oral anticoagulant agent is reasonable for 3 to 6 mo, followed by antiplatelet therapy.	Class IIa, Level C