INTRODUCTION AND THE IMPORTANCE OF LIFESTYLE

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Epidemiology
The latest epidemiological data indicates that 795,000 new and recurrent strokes occur in the US annually. [1] In 2013, stroke fell from the fourth to the fifth leading cause of death in the United States. Stroke is also a leading cause of adult disability with an estimated 7.2 million stroke survivors > age 20-years in the country in 2014. [1] The direct and indirect cost of stroke was estimated to be $33.9 billion in 2012-2013 (direct medical cost $17.9 billion). [1]

Between 2004-2014, stroke-related mortality has dropped by about 28.7%. [1] Some of this decline may be attributed to improved acute therapy, but the available data suggests that most of the decline is related to improved prevention. [2, 7655] Although neurologists have traditionally focused on secondary prevention, nearly 80% of strokes are first events. [1] Every neurologist has a role in primary stroke prevention. Although the patient may be seen by a neurologist for other issues, being aware of preventive interventions and providing the patient and referring physician with appropriate recommendations may help to avoid devastating event. One study found that 75% of strokes were at least partially preventable and approximately 25% were highly preventable. [3]

Primary Prevention: Lifestyle
Lifestyle factors have a considerable impact on stroke risk. One analysis found that those who adhere to 5 lifestyle factors (not smoking, following a "healthy" diet, engaging in regular physical activity, having an optimal body weight, and consuming alcohol in no more than moderate amounts) had a 80% lower risk of stroke as compared to those who did follow these lifestyles. [4] Additional studies show that both a DASH-type and Mediterranean-type diets are associated with lower stroke risk. [5, 6] There was a "dose response" in that risk reduction increased based on the number of healthy lifestyle behaviors followed. In addition, adherence to stroke prevention lifestyle recommendations may impact other neurological conditions. For example, there is a significant overlap in risk factors for stroke and Alzheimer's disease. [7] Incorporating lifestyle education and recommendations into patient encounters helps to improve the likelihood of patient compliance and behavior change, regardless of the primary reason for the visit.

Primary Prevention: Blood pressure.
Hypertension is the single most important treatable stroke risk factor. Lifestyle factors can have a dramatic effect on lowering blood pressure and should not be neglected. [8] These include weight reduction, adopting the DASH eating plan, reducing dietary sodium (current recommendation 1500-mg/d), engaging in physical activity and moderating alcohol consumption). Overall, every 10-mmHg reduction in blood pressure is associated with a 31% relative risk reduction for stroke. [9]

Although lowering blood pressure is generally more important than the type of drug used, analyses suggest an association between increased inter-visit blood pressure variability and stroke risk after adjustment for mean systolic blood pressure. [10] Meta-regression analysis also shows a linear relationship between an index of variability and stroke. [11] From a clinical standpoint, it is apparent that different classes of antihypertensives have different effects on blood pressure variability. [11] Calcium channel blockers (CCBs) have the least effect on increasing this variability as compared to beta-blockers, which have the greatest effect. [11] As compared to CCBs, beta-blockers are least effective in reducing stroke, and based on these analyses, should generally be avoided for stroke risk reduction. Chlorthalidone, a long acting diuretic, may be more effective than hydrochlorthiazide in preventing vascular events. [12] National guidelines provide specific recommendations for blood pressure management. [13, 14] It should be noted that these two sets of guidelines differ in some of their recommendations. Since the publication of these guidelines, HOPE-3 found that treatment with candesartan plus hydrochlorothiazide was not associated with a lower rate of major cardiovascular events (including stroke) than placebo among persons at intermediate risk who did not have cardiovascular disease. [15]

Primary Prevention: Aspirin
Meta-analysis of 9 clinical trials with 100,076 subjects found aspirin reduced the risk of ischemic stroke (RR 0.86,

95% CI 0.75-0.98), which was balanced by an increase in hemorrhagic stroke (RR 1.36, 95% CI 1.01-1.82) with no heterogeneity among trials. [16] Other meta-analyses had similar results. The U.S. Preventive Services Task Force (USPSTF) recommends aspirin at a dosage of 75 mg/d to prevent myocardial infarction (but not stroke) in men age 45 to 79 years and to prevent stroke in women age 55 to 79 years based on their vascular risk and the chances of serious gastrointestinal hemorrhage.[17] The USPSTF noted that the 10-year level of cardiovascular risk for which that benefit exceeds bleeding risk varies from 3-11 percent depending on age and sex. The most recent AHA Guideline for the Primary Prevention of Stroke also recommends the use of aspirin for cardiovascular (including but not specific to stroke) prophylaxis for people whose risk is sufficiently high (10-year risk >10%) for the benefits to outweigh treatment associated risks. [18] There is no evidence that antiplatelet medications reduce the risk of stroke. [18]

Patients with diabetes are at increased stroke risk. The Japanese Primary Prevention of Atherosclerosis With Aspirin for Diabetes (JPAD) Trial randomized 2,539 patients with type 2 diabetes without a history of atherosclerotic disease (including stroke) to low-dose aspirin (81or100 mg per day) or no aspirin. [19] The primary outcome was the occurrence of atherosclerotic events (fatal or nonfatal ischemic heart disease, fatal or nonfatal stroke, and peripheral arterial disease). There was no effect of aspirin on the trial's primary endpoint (HR 0.80, 95% CI 0.58 to 1.10, p= 0.16) and no effect on cerebrovascular events (2.2% with aspirin vs. 2.5% with no aspirin, HR 0.84, 95% CI 0.53 to 1.32, p=0.44). Meta-analysis of 7 trials (11,618 subjects) of the effects of aspirin in patients with diabetes found a treatment-associated 9% reduction in major cardiovascular events (risk ratio [RR] 0.91; 95% CI 0.82-1.00), but no significant stroke reduction (RR, 0.84; 95% CI 0.64-1.11). [20] A multi-society position paper on the primary prevention of cardiovascular events in people with diabetes recommended low dose aspirin for adults with diabetes who have a 10-year cardiovascular risk >10% (men over age 50 years and women over age 60 years who have at least one additional major risk factor such as smoking, hypertension, dyslipidemia, a family history of premature CVD, or albuminuria) and who are not at high risk of aspirin-related bleeding complications. [21] It was further recommended that aspirin not be used for cardiovascular prevention among those with diabetes at low risk, and that it might be considered for those at intermediate (10-year risk in the 5-10% range) risk. AHA Primary Stroke Prevention Guidelines similarly indicate that aspirin is not useful for preventing a first stroke in people with diabetes mellitus in the absence of other high-risk conditions. [18]

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