Stroke and the Metabolic Syndrome in Populations
The Challenge Ahead

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The metabolic syndrome (MetS) is a constellation of interrelated metabolic abnormalities, including insulin resistance/diabetes, elevated blood pressure, obesity, and dyslipidemia. Sedentary lifestyle, dietary changes, and the obesity epidemic have led to a rising prevalence of MetS, with the syndrome now affecting an estimated 47 million adults in the United States.

Current American Stroke Association guidelines for primary prevention of stroke categorize MetS as a less well-documented risk factor. Although MetS is known to increase all-cause cardiovascular morbidity and mortality, less information is available on the relationship between the syndrome and risk of stroke. To address this, within the last year several large prospective studies have examined the risk for stroke in individuals with MetS. To date, reports have concentrated predominantly on elderly subjects and have not fully evaluated which of the individual MetS components confers greatest risk.

In this issue of Stroke, Rodriguez-Colon et al. investigated the rates of MetS components and incident stroke in almost 15,000 middle-aged individuals followed-up prospectively for 9 years as part of the Atherosclerosis Risk in Communities study. At baseline ~39% of participants, with a mean age of 54, met the National Heart, Lung, and Blood Institute/American Heart Association criteria for MetS. On follow-up, the relative risk for incident stroke was more than doubled in individuals with MetS as compared to those without. After adjusting for other risk factors, a graded, dose-dependent relationship was observed between the number of MetS components and risk of stroke, with an almost 5-fold increase in stroke incidence for those having all 5 components. The authors further stratified their analysis by dividing MetS into categories based on the individual components present. Although all MetS components contributed to stroke risk, they found that groups with elevated blood glucose or elevated blood pressure were at the greatest risk for stroke.

The present study adds to the growing body of evidence linking MetS to stroke and other vascular events and is important for several reasons. The data were collected in the late 1980s and the baseline demographics depict a high rate (almost 40%) of MetS in the general community at that time. The prevalence of obesity and overweight has been increasing in children and adults in many Western societies, and it is likely that rates of MetS have also worsened in the Atherosclerosis Risk in Communities population in the 2 intervening decades. Moreover, the study participants were ethnically diverse and generally middle-aged at ascertainment. Thus, the result extends previous reports of an association between MetS and stroke to a younger and larger at-risk population. The increased risk of stroke with MetS observed in this study was based on the National Heart, Lung, and Blood Institute/American Heart Association definition, which specifies blood pressure and fasting glucose limits lower than those required by current criteria for a diagnosis of hypertension or diabetes. Perhaps most striking, only 11% of study participants met criteria for type 2 diabetes mellitus, whereas almost half (48.8%) had impaired fasting glucose, which was an important contributor to stroke risk in their cohort.

Given the serious implications of these findings on stroke risk in the wider population, what response might be effective to reduce the burden of stroke likely attributable to the MetS? For individual patients, the clear challenge for physicians is early identification of those at highest jeopardy. The findings of Rodriguez-Colon et al. may help in this regard, because knowledge of the most detrimental MetS components will direct efforts toward reduction of blood glucose and blood pressure in at-risk individuals. Current guidelines emphasize the importance of advising lifestyle modification for primary prevention in patients with dyslipidemia, impaired glucose tolerance, and elevated blood pressure, with an emphasis on diet, salt intake, alcohol reduction, and physical activity. Unfortunately, we suspect that counseling of individual patients by clinicians is unlikely to be effective in reaching the majority of those at risk, because many will not seek medical attention until after a stroke or other vascular event has occurred. Therefore, at a population level, sustained dialogue with legislators in the health, transport, and education sectors is required to influence policy with the aim of promoting a “vascular-friendly” lifestyle. One good example has been legislation banning smoking in the workplace introduced in Ireland and other countries in recent years. Other innovative policy approaches might include improved food labeling, diet and health education in schools, and reducing car dependency by introducing dedicated cycle lanes and improved public transport systems. Randomized clinical trials, sophisticated health surveillance systems, and population studies repeated over time will be required to assess the effect of specific strategies on incidence and

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outcome of stroke and other vascular disorders. The high frequency of MetS is an indicator of current lifestyle patterns in many developed societies—a multipronged, multisectoral approach will be required to effectively impact it. Tackling this issue will be a major challenge in the years ahead.

**Disclosures**

None.

**References**


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