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SPECIAL FOCUS ISSUE: CARDIOVASCULAR HEALTH PROMOTION

EDITORIAL COMMENT

Lifestyle and Cardiovascular Disease

More Work to Do*

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Over the last 60 years we have learned immensely about both the causes and the effective prevention and management of ischemic heart disease and stroke. Our advances in understanding include topics ranging from the genetic level to the population level and many cellular, clinical, therapeutic, and physiological discoveries in between. This research has been developed, tested, and expanded in all corners of the globe. Although differences may exist among countries, what is remarkable is how much similarity there is in understanding the causes of cardiovascular disease in different populations.

Our basic, biomedical, clinical, and epidemiological research efforts have established the major physiological risk factors. In addition, these efforts have led to many advanced treatments for such risk factors as elevated blood pressure and dyslipidemia in the form of antihypertensive medications and hydroxymethylglutaryl-coenzyme A reductase inhibitors (statins) that are now generically available throughout the world, as well as other new medications. Despite these improvements, adherence to medications for primary and secondary prevention remains insufficient globally. Using U.S. pharmacy data from outpatient sources, only 43% of patients at 1 year are adherent to a regimen with statins, 40% with beta-blockers, and 38.8% with angiotensin-converting enzyme inhibitors or angiotensin receptor blockers (1). Adherence to optimal medical therapy of the foregoing 3 medication classes and aspirin is as low as 19% (1-3). In low-income countries the numbers are even worse, with <5% of some Africans using statins despite indications for secondary prevention (4).

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In addition to clinically measured risk factors, investigators have elucidated behavioral risk factors. In this issue of the *Journal*, Lv et al. (5) show that adherence to certain healthy lifestyles was associated with reduced risk of developing major coronary events or strokes. The healthy factors (nonsmoking, light to moderate alcohol intake, high physical activity, diet rich in vegetables and fruits and limited in red meat, and low adiposity) were independently associated with reduced cardiovascular disease events. The large, prospective cohort study conducted in China by Lv et al. (5) confirms the similar findings seen in both high- and low-income countries. These results are similar to those in other cohorts in high-income countries and other case-control studies in other low- and middle-income countries such as the INTERHEART study (6).

Unfortunately, with the large numbers of people who do not maintain ideal healthy lifestyles, we still have much to learn regarding solutions to many of the barriers to behavioral patterns. Only 1% of the Chinese population in the study had favorable levels of all 5 lifestyle factors. There have been significant gains made in tobacco control globally; age-adjusted prevalence has declined by 25% to 40% relatively globally over the last the 30 years, although some regions have had more success than others (7). However, the rate of decline has begun to taper, so there is more work to do including broader implementation of the Framework Convention on Tobacco Control.

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In some respects, it is not surprising that the trends in smoking declines are better than trends for diet and exercise. The movement against tobacco worldwide has been strong and consistent. The message is clear that no amount of tobacco is safe and that smoking can even harm others around you, hence the strong and successful efforts for taxation and bans on tobacco in public spaces and private establishments such as restaurants.

Unfortunately, the messages regarding nutrition and exercise from the scientific community have been far from consistent. The public has been told that eggs are good, then bad, and now maybe not so bad and perhaps good or at least neutral. The public has been told that fats in general are bad, and now the message is that perhaps some fats (omega-3 and omega-6 polyunsaturated) are good, whereas others are bad (trans-fats) or neutral (animal fats). At one time we have advised people to focus only on calories regardless of source, and now we suggest that certain sources of calories may be more helpful than others. Vegetables are good, but white potatoes perhaps are not so good. The list goes on. When we had too few nutrients as a focus, such as vitamin C for sailors suffering from scurvy or other nutrient deficiency-related diseases, we paid less attention to overall dietary patterns. Now that we have food in excess in all but a few regions of the world, the focus must return to overall diets, and the message must be delivered in a way that encourages healthy patterns. In addition, unlike tobacco, no level of which is safe, there is likely to be more than 1 pattern, such as the Mediterranean and Dietary Approaches to Stop Hypertension (DASH) diets. The same challenge is there for exercise. For the most part, the health professions' message regarding exercise is that it promotes cardiovascular health, but there has even been some controversy around strenuous endurance exercise and cardiovascular risk (8).

It is only more recently that we are becoming more sophisticated regarding our recommendations for nutrition and exercise. Global trends in healthy food consumption are mixed. In the United States, there has been an improvement in the overall American Heart Association primary diet score from 2000 to 2012 that was driven mainly by increases in consumption of whole grains and nuts or seeds and decreases in sugar-sweetened beverages (9). However, only 0.4% of countries consume the recommended amount of vegetables (400 g/day) or fruits (300 g/day). Only 20% of countries meet recommendations for red meat consumption (<1 portion [100 g] per week) (10). On a positive note, consumption of fruits, nuts, and seeds increased from 1990 to 2010. In contrast, red meat consumption also increased, and consumption of whole grains declined globally. Overall, the evaluation of diets suggests that we should not focus only on fruits, vegetables, and red meat. Dietary policies and research should not emphasize isolated nutrients but rather foods and overall dietary patterns. Furthermore, there needs to be a better understanding of when or where public policies, education initiatives, or clinical interventions focused on behavioral change should be the primary targets (11).

Recently, several approaches that lead to improved lifestyle risk factors have been evaluated or implemented. Information technology has been used in all lifestyle areas and has been evaluated extensively. One systematic evaluation of Internet- and cellular phone-based interventions reported improvements in diet, physical activity, tobacco use, adiposity, and excess alcohol consumption related to these technologies (12). However, most of the findings were from studies lasting 6 months or less that were conducted in high-income countries. Therefore, more research is needed to understand both the long-term effects of these interventions and the reproducibility of these interventions in low-income settings. In the end, we must find a simple but clear message regarding diet and exercise that is a little like what our grandmother might say, "Everything in moderation but make sure you eat your vegetables."

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