Letters to the Editor

Mortality From Stroke and Ischemic Heart Disease Increases Exponentially With Blood Pressure

To the Editor:

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) is an important update to hypertension prevention and management.1

The report states that stroke and other cardiovascular (CV) mortality increases “progressively and linearly” with blood pressure (BP) and “there is a doubling of mortality” for each 20/10 mm Hg increase in BP, starting at levels as low as 115/75 mm Hg (page 1210 in Reference 1). These statements are made in reference to a meta-analysis by the Prospective Studies Collaboration (PSC) that includes about 1 million persons.2 The PSC study describes the relationship between CV mortality and BP level as “approximately log-linear” and uses log-linear graphs for comparisons (page 1907 in Reference 2). That CV mortality rises exponentially with BP is more easily demonstrated using a linear graph of values selected to illustrate stroke mortality for persons 60 to 69 years of age (Figure 1A).2 Plotting the same values on a log-linear graph, as in the PSC study, generates a linear depiction of the exponential function (Figure 1B). Emphasizing the exponential relationship between stroke and ischemic heart disease mortality and BP is important for several reasons, two of which are addressed herein. Exponential decline in CV risk with incremental decreases in BP highlights the basis for significant reductions in mortality associated with only modest declines in blood pressure.2 This exponential or compounding relationship is a powerful and important one for clinicians, public health professionals and health policy makers to understand because it adds urgency to the need to control blood pressure to recommended target levels while pointing to a potential for compounded benefit associated with reducing blood pressure levels deemed inappropriate by the physician. By clarifying this basis for the need to achieve better BP control locally, nationally, and internationally, a better understanding of the compounding effect of blood pressure on cardiovascular risk is beyond important—it is essential.

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Response

Dr. Fields makes an important point that needs to be stressed again and again. Rising blood pressure (BP) compounds the effect on cardiovascular risk, and declining BP is associated with a compounding benefit. He provides additional evidence why small reductions in BP can yield significant reductions in morbidity and mortality.

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Risk of stroke mortality doubles per 20 mm Hg increase in systolic blood pressure (SBP).1,2

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