The current guidelines for hypertension\textsuperscript{1,2} are based on the paradigm that lower pressure implies lower cardiovascular risk, as predicted by the linear logistic model. My fellow researchers and I selected the 18-year Framingham\textsuperscript{3} data for scrutiny for the relation of either overall or cardiovascular death to systolic blood pressure (SBP) because these data almost uniquely satisfy the following four conditions:

- It was accurately gathered;
- It was not confounded by antihypertensive drug intervention;
- It included women; and
- It included older people.

Our reanalysis\textsuperscript{4} proved that the linear logistic model is actually statistically rejected for the relation of both overall and cardiovascular death to SBP. Statistical theory now tells us that the paradigm must be false for the Framingham target population, and, importantly, this conclusion cannot be reversed by the result of any other study. In fact, there are only three possibilities for any study failing to reject the linear logistic model for these relations:

- The study does not have enough power to detect that the linear logistic model did not hold (e.g., it was too small);
- It is seriously biased; or
- It is a sample from a population that is considerably different than the Framingham target population.
The new model my colleagues and I introduced for the relation of either overall or cardiovascular death to SBP differs from the old paradigm in four important ways:

- A person of a given age and sex has an intrinsic background risk of either overall or cardiovascular death that is independent of SBP;
- There is an age- and sex-dependent threshold (the 70th percentile for a person of a given age and sex);
- All pressures below the threshold have the same risk as background; and
- Risk increases rapidly as pressures increase above threshold.

Having a precise threshold at which risk abruptly begins to increase is an artifact of the model. It is a simplification for having risk constant to at least the 70th percentile, definitely increasing past the 80th percentile, and changing in a smooth manner at some indeterminate point between these two percentiles.

The new model shows that the universal cut point of 140 mm Hg has no foundation; the cut point for hypertension must be age and sex dependent. A very conservative cut point would be at the chosen threshold. Less conservative would be at the 80th percentile. All of the conservative cut points exceed 140 mm Hg. Consequently, our findings show that those people now considered to be at increased risk simply because their SBP exceeds 140 mm Hg, but who have pressures below our conservative cut point, are not at any increased risk. On the other hand, persons whose pressures exceed the new cut points may be at even greater risk than previously believed.

A statement of Dr Daniel Levy, the current director of the Framingham study, exemplifies the most prevalent argument against our findings. Their [Port and colleagues] analysis is correct as far as it goes, but it ignores the mountains of other evidence for the direct relation of blood pressure to disease risk. At first glance, such criticisms seem eminently reasonable; there certainly have been numerous other studies reporting linear relations of risks to pressure. However, in view of our findings on the Framingham data (surely one of the highest mountains), this evidence must now be taken with considerable skepticism. First, as discussed above, the results from studies cannot salvage the fact that the current paradigm is false. Secondly, virtually all studies reporting a linear relation of risk to pressure use the same methods as used in Framingham (i.e., the linear logistic model). Therefore, the asserted linearity must now be seriously questioned. Finally,
despite popular belief to the contrary, clinical trial results are silent on the issues raised in our paper. None has ever shown a benefit from reduction from our thresholds to below 140 mm Hg. Additionally, there is ever-increasing evidence that it is the direct cardiovascular action of the drugs, and not their effect on blood pressure, that is producing the observed benefit in these trials.⁶,⁷

Sound scientific methodology now indicates that not only must the current guidelines be reconsidered, but, additionally, the studies that led to these guidelines must be re-evaluated using more-refined statistical methods (e.g., those used in our paper).

REFERENCES