Hypertension

JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart Association®

Learn and Live℠

Letters to the Editor: Calculation of Reflection Wave Transit Time and Paired Data Analysis

Wonsik Ahn and Jae Hyon Bahk

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://hyper.ahajournals.org/cgi/content/full/45/5/e13

Letters to the Editor

Letters to the Editor will be published, if suitable, as space permits. They should not exceed 1000 words (typed double-spaced) in length and may be subject to editing or abridgment.

Calculation of Reflection Wave Transit Time and Paired Data Analysis

To the Editor:

There are countless ongoing debates and discrepancies in the medical field. Some of the causal issues at the heart of these debates include detection errors, individual variations of recruited subjects, and, simply, our shortage of knowledge about human beings. There is another commonly noted source of discrepancy, statistical error. One frequently occurring misconception involves paired data analysis. Health scientists use several examples of paired data, for instance, right–left differences, arm–leg pressure differences, and variations in arterial pressure waveforms. I have observed one discrepancy of reflection wave transit time (RWTT) during arterial pressure wave form analysis.[1–3] One report stated a mean of RWTT is 102 to 116 ms.[1] The other stated the mean of RWTT is 129 ms.[2] As to the cause of this variation, Mitchell et al "suspected" in his reply:

"We suspect . . . . Rather than analyze individual high-fidelity waveforms, they ensemble-averaged waveforms from decade groups of participants into a single 'age-decade wave,' which was analyzed to obtain 'mean' waveform characteristics. This averaging process may have obscured waveform landmarks."

After reading this paragraph, some readers might think that both methods are adequate to obtain the RWTT and we could, in fact, take either result of RWTTs. However, from a statistical point of view, RWTT should be calculated from an individual waveform and then be averaged, because both foot and shoulder points are obtained from each volunteer, so they are matched.

Paired data misanalysis is one of the most common errors in medical data analysis. If we use an independent analysis method instead of a dependent one, the results have less difference and, at times, no difference. Therefore, we should carefully analyze paired data with adequate statistical methodology.

Wonsik Ahn and Jae Hyon Bahk
Department of Anesthesiology
Seoul National University Hospital
Seoul, South Korea

1. Kelly R, Hayward C, Avolio A, O'Rourke M. Noninvasive determination of age-related changes in the human arterial pulse. *Circulation*. 1989;80: 1652–1659.
2. Mitchell GF, Parise H, Benjamin EJ, Larson MG, Keyes MJ, Vita JA, Vasan RS, Levy D. Changes in arterial stiffness and wave reflection with advancing age in healthy men and women. The Framingham Heart Study. *Hypertension*. 2004;43:1239–1245.
3. O'Rourke MF, Nichols WW. Changes in wave reflection with advancing age in normal subjects. *Hypertension*. 2004;44:E10–E11.