Fourteen years ago, Chen Chen-Huan et al. from Baltimore were the first to validate use of a transfer function method for generation of the aortic from the radial artery pressure waveform. This technique had the potential capacity to link the century old brachial cuff sphygmomanometer with the even older clinical method of palpating or directly recording the radial arterial pressure wave. There was a clear prospect of merging the two so as to generate central aortic pressure, as a simple procedure in a physician’s office.

Such a view has been under attack and scrutiny since. In the process of different investigations, which entailed measurements of intra-arterial and cuff pressures in the aorta and upper limb, it became apparent that the greatest inaccuracy in using any method to generate central pressure was the difference—often vast—between cuff and intra-arterial pressure in the upper limb. This problem is intrinsic to the cuff and has not been overcome. Hopefully it will, and soon.

In this edition of American Journal of Hypertension, Chen Chen-Huan and colleagues, now in Taiwan, have conducted an elegant study, to answer key questions that have arisen over 14 years, through avoiding the various pitfalls which have swallowed others. They recorded simultaneously, at cardiac catheterisation, high-fidelity pressure waves in the ascending aorta and brachial artery, together with indirect pressure by brachial cuff in the opposite arm. Thereby, they could assess the errors that result from the sensor (intra-arterial or tonometer), the transfer function process, and the brachial cuff system in calculation of ascending aortic pressure. Their findings were that the output errors for measurement of central aortic systolic, diastolic, and pulse pressures were identical (<1mm Hg) to the input errors in measurement of the brachial values by cuff. In other words, the transfer function was accurate and could be used whenever the arm pulse waveform could be accurately recorded. Any significant inaccuracy was attributable to the cuff itself. This view conforms with recent data from Kips et al. which found a very close correlation from waveforms measured by radial tonometry, and those of O’Rourke and Takazawa. The latter, noting that while central aortic pressure is superior to brachial, the acknowledged value of brachial pressure is retained when central aortic pressure is expressed in terms of brachial pressure (even though the absolute values were not expected to be the same as when actually measured invasively).

The findings of all the above are followed when the transfer function is used as originally described, by calibrating the radial artery pressure wave, measured by applanation tonometry, to the best available measure of arterial pressure; this was then and still is the brachial cuff sphygmomanometer value, obtained according to current guidelines.

Disclosure: M.F.O. is founding director of AtCor Medical, maker of the SphygmoCor system which utilizes a generalized transfer function to generate the aortic from the radial artery pressure waveform.