Central Pressure and Pulse Wave Amplification in the Upper Limb

To the Editor:

The important review of pulse pressure (PP) amplification\(^1\) was directed at better understanding of central (ascending aortic or carotid) pressure generated from upper limb measurements of cuff arterial pressure and pressure waveforms. One important issue, not addressed by the authors, is how 2 different noninvasive techniques, widely used in current literature, can give different values of amplification and, thus, different values of central pressure from the same data recorded in the upper limb.

In the accompanying Table, compiled from articles quoted in the review, plus several others, invasive data give average values of 38% amplification and an average difference in systolic pressure (SP) of 14.5 mm Hg. The noninvasive generalized transfer function method\(^2\) (second column) showed similar values. The late systolic shoulder method\(^3\) provides values similar to the generalized transfer function method but has been applied less frequently. In contrast, central SP and PP calculated by extrapolation from mean and diastolic brachial values\(^4\) showed far smaller values of amplification, and average SP difference was just 1 mm Hg. Central SP and PP were virtually identical to brachial pressure! To our knowledge, this method has not been compared against invasively recorded central and peripheral waveforms and has not gained US Food and Drug Administration approval. It appears to be flawed.\(^5\)

## Disclosures

M.F.O. is the founding director of AtCor Medical, Sydney, Australia, maker of a pulse-wave analysis system.

### Michael F. O’Rourke

**Audrey Adji**

*St. Vincent’s Clinic*

**University of New South Wales**

**Victor Chang Cardiac Research Institute**

**Sydney, Australia**


9. Asmar RG, London GM, O’Rourke MF, Safar ME; for the REASON Project Coordinators and Investigators. Improvement in blood pressure, and pulse pressure waveforms. One important issue, not addressed by the authors, is how 2 different noninvasive techniques, widely used in current literature, can give different values of amplification and, thus, different values of central pressure from the same data recorded in the upper limb.

In the accompanying Table, compiled from articles quoted in the review, plus several others, invasive data give average values of 38% amplification and an average difference in systolic pressure (SP) of 14.5 mm Hg. The noninvasive generalized transfer function method\(^2\) (second column) showed similar values. The late systolic shoulder method\(^3\) provides values similar to the generalized transfer function method but has been applied less frequently. In contrast, central SP and PP calculated by extrapolation from mean and diastolic brachial values\(^4\) showed far smaller values of amplification, and average SP difference was just 1 mm Hg. Central SP and PP were virtually identical to brachial pressure! To our knowledge, this method has not been compared against invasively recorded central and peripheral waveforms and has not gained US Food and Drug Administration approval. It appears to be flawed.\(^5\)

## Disclosures

M.F.O. is the founding director of AtCor Medical, Sydney, Australia, maker of a pulse-wave analysis system.

### Michael F. O’Rourke

**Audrey Adji**

*St. Vincent’s Clinic*

**University of New South Wales**

**Victor Chang Cardiac Research Institute**

**Sydney, Australia**


9. Asmar RG, London GM, O’Rourke MF, Safar ME; for the REASON Project Coordinators and Investigators. Improvement in blood pressure,


25. Waddell TK, Dart AM, Medley TL, Cameron JD, Kingswell BA. Carotid pressure is a better predictor of coronary artery disease severity than brachial pressure. Hypertension. 2001;38:927–931.


Central Pressure and Pulse Wave Amplification in the Upper Limb
Michael F. O'Rourke and Audrey Adji

Hypertension. 2010;55:e1-e2; originally published online November 30, 2009;
doi: 10.1161/HYPERTENSIONAHA.109.140509
Hypertension is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2009 American Heart Association, Inc. All rights reserved.
Print ISSN: 0194-911X. Online ISSN: 1524-4563

The online version of this article, along with updated information and services, is located on the
World Wide Web at:
http://hyper.ahajournals.org/content/55/1/e1

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published
in Hypertension can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial
Office. Once the online version of the published article for which permission is being requested is located,
click Request Permissions in the middle column of the Web page under Services. Further information about
this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Hypertension is online at:
http://hyper.ahajournals.org//subscriptions/