



Conference Abstract

# P.04 A Transfer-Function-Free Technique for the Non-Invasive Estimation of Central Arterial Pressure

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**Keywords**

Non-invasive pressure estimation

**ABSTRACT**

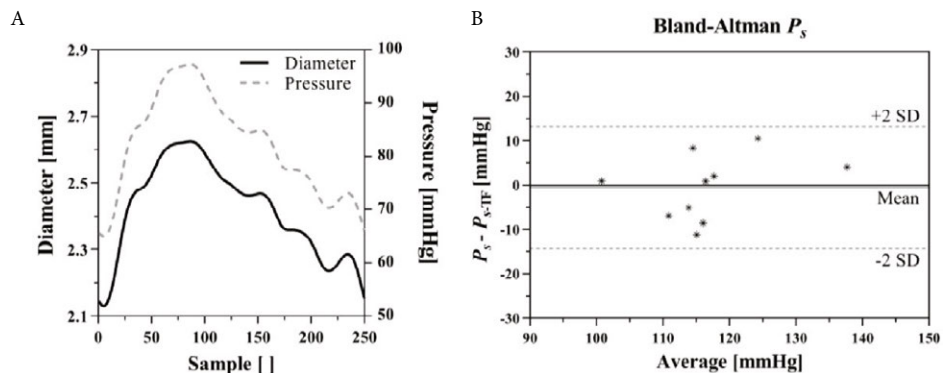
**Background:** Central aortic pressure (CAP) is important for the determination of the cardiovascular risk. Transfer function (TF)-based techniques allow for estimating CAP non-invasively from pressure waveforms acquired distally in the circulation. However, TF-based CAP might preserve the high frequencies of the distal waveform [1]. Therefore, we propose a new method where CAP is estimated from local direct non-invasive measurements of diameter (D) and blood velocity (U) waveforms.

**Methods:** Aortic root D and U were measured using an ultrasound scanner (GE, Vivid E95) in 10 healthy volunteers (46 ± 15 years, 5 men), and used to determine local wave speed (PWV) using the lnDU-loop method [2]. Brachial systolic ( $P_s$ ) and diastolic blood pressure ( $P_d$ ), as well as central  $P_s$ , were also estimated using a sphygmomanometer (Uscom, BPPLUS-R7). CAP was determined as:

$P_s = \frac{1}{\rho} \left( \frac{D}{U} \right)^2$ , where, and blood density = 1060 kg/m<sup>3</sup>.

**Results:** Mean brachial  $P_s$  and  $P_d$  were 124.1 ± 9.5 and 77.9 ± 5.4 mmHg, respectively. Mean PWV was 3.07 ± 0.71 m/s, leading to  $\rho = 1.00 \pm 0.46$ . The average calculated  $P_s$  was only -0.4% lower than TF- $P_s$  (116.4 ± 11.2 vs. 116.9 ± 8.9, mmHg). Estimated calculated aortic and measured brachial mean pressure were almost identical with a difference of 0.01% (97.8 ± 6.9 vs. 97.8 ± 6.5, mmHg).

**Discussion:** This proof-of-concept study shows that the CAP waveform can be estimated non-invasively from measurements of brachial  $P_d$  and aortic D and U obtained using equipment available in almost every cardiovascular clinic. Further studies are warranted to establish the full utility of the new technique.



**Figure** | A: typical example of aortic D converted into CAP. B: Bland-Altman comparison between calculated and TF  $P_s$ .

**REFERENCES**

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