

## PULSE PRESSURE AMPLIFICATION

<p>What is it?</p>	<p>Pulse pressure amplification (PPA) refers to the phenomenon of pulse pressure (PP) widening from the ascending aorta to the peripheral arteries, most commonly to the brachial artery where blood pressure (BP) is conventionally measured.</p> <p>Increased central PP is the result of both cardiac and arterial factors: ventricular ejection, arterial stiffness, amplitude and timing of wave reflection. [Nichols 2011]</p> <p>Physiologically, the progressive stiffening of the arterial wall from the center to the periphery, together with the pressure wave reflections, maintains and even amplifies BP in order to guarantee correct organ perfusion. Thus, central systolic BP (SBP) and PP are lower than brachial SBP and PP for the same mean and diastolic BP. Arterial stiffening (e.g., secondary to ageing, hypertension, or systemic inflammation) leads to a faster and earlier return of reflected waves in ascending aorta, thus increasing central SBP and reducing PPA between central and peripheral arteries. [Nichols 2011]</p>
<p>Why do we measure it?</p>	<p>PPA is correlated to cardiovascular risk, and it has shown a predictive prognostic value in several population studies. [Salvi 2010, Benetos 2010, Safar 2002]</p> <p>Central PP may respond differently to BP-lowering drugs compared with brachial PP, [Protogerou 2009] with some antihypertensive drug having a central PP-lowering effect beyond peripheral PP. Better risk estimates are derived from central PP compared with conventional peripheral cuff PP. [Vlachopoulos 2010, Roman 2009, Benetos 2012]</p>
<p>How can it be measured</p>	<p>PPA is obtained from the ratio of peripheral (typically brachial) PP to central PP: <math>PPA = \text{peripheral PP} / \text{central PP}</math></p>
<p>Where is it measured?</p>	<p>Peripheral PP can be determined by brachial (or radial) BP measurement, using either an oscillometric BP device or the pressure wave tonometric measurement, calibrated to brachial cuff SBP and DBP. [Agnoletti 2012]</p> <p>Central PP can be obtained by tonometric radial pressure wave with the application of a generalized transfer function, or directly by the tonometry of the carotid artery (which approximates very closely the aortic pressure curve). Both tonometric curves should be calibrated to the mean BP obtained by the radial (or brachial) pressure curve, which is in turn calibrated to brachial cuff SBP and DBP.</p>

<p>Figure</p>	<p>In blue are represented the reflected waves; in red is represented the contribution of the reflected wave to the measured pressure curve in aorta.</p>
<p>References</p>	<p>Nichols et al. 2011.  <a href="http://online.vitalsource.com/books/9781444150445">http://online.vitalsource.com/books/9781444150445</a>          Salvi et al. 2010. DOI: 10.1097/HJH.0b013e32833c48de          Benetos et al. 2010. DOI: 10.1016/j.jacc.2009.09.061          Safar et al. 2002. DOI: 10.1161/hy0202.098325          Protogerou et al. 2009. DOI: 10.2174/138161209787354267          Vlachopoulos et al. 2010. DOI: 10.1093/eurheartj/ehq024          Roman et al. 2009. DOI: 10.1016/j.jacc.2009.05.070          Benetos et al. 2012. DOI: 10.1016/j.jacc.2012.04.055          Agnoletti et al. 2012. DOI:          10.1016/j.atherosclerosis.2012.06.055</p>

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