

FLOW-MEDIATED DILATION (FMD)

<p>What is it?</p>	<p>In the 1990s, a technique for the assessment of endothelium-dependent Flow-Mediated Vasodilation (FMD) was developed [Celermajer 1992] and guidelines for its assessment from ultrasound imaging in the brachial artery have been well established [Corretti 2002].</p> <p>The technique induces the release of nitric oxide (NO), resulting in arterial dilation that can provide information about endothelial vasomotor function.</p> <p>More specifically, the procedure requires the subject to be supine, at rest, in a quiet air-conditioned room. Brachial artery longitudinal images are acquired with a linear ultrasound probe above the antecubital fossa. After a baseline measurement (generally 1 min), a sphygmomanometric cuff, placed distal to the analysed vessel, is inflated to suprasystolic pressure, occluding arterial blood flow. Occlusion is maintained for 5 minutes, after which the cuff is deflated. The subsequent reactive hyperemia leads to an increase in shear stress stimulus, which in turn induces the endothelium to release NO, a vasodilator.</p> <p>FMD is quantified as the percentage change in diameter from the baseline to the maximum value obtained after cuff deflation. The brachial artery should be imaged for at least 3 minutes after deflation.</p>
<p>Why do we measure it?</p>	<p>FMD approach is based on the assessment of an endothelium-dependent response to an increased blood flow and the resulting increase in shear stress (see Endothelium). FMD is related to coronary artery endothelial function and cardiovascular risk factors; it is an independent predictor of cardiovascular disease outcome [Thijssen 2019].</p>
<p>How can it be measured?</p>	<p>FMD can be measured with ultrasound by using linear array probes with frequencies ranging 7.5-12 MHz are usually adopted for imaging acquisition. Automated and semi-automated systems processing the ultrasound data have been developed [Thijssen 2019]. These systems can be based for example on wall tracking algorithm that, by processing the image sequences, can provide reliable diameter assessment throughout the entire examination [Ghiadoni 2012]. Real-time approach is preferable above an offline processing approach, due to the immediate feedback provided to the operator.</p> <p>A probe holder is highly recommended in order to maintain the position of the ultrasound probe during the examination [Thijssen 2019].</p> <p>Pulsed Doppler velocity signal obtained from a midartery sample volume can be used to verify and quantify the shear rate stimulus provoking the vessel reaction.</p>

<p>Where is it measured?</p>	<p>FMD is typically measured at brachial artery (typical diameter 3–5mm). The same approach can also be performed at the radial, superficial femoral or popliteal arteries [Thijssen 2019].</p>
<p>Figure</p>	<div data-bbox="746 443 1209 840" data-label="Figure"> </div> <p>Flow-Mediated Dilatation timeline and example of a related diameter plot. After a baseline measurement, the arterial flow is occluded for 5 minutes by a cuff. When the cuff is deflated, the subsequent reactive hyperemia provokes an increase in shear stress stimulus that induces, in a healthy vessel, a vasodilation. Diameter values are obtained by processing of longitudinal ultrasound scans of the vessel (top).</p>
<p>References</p>	<p>Celermajer, 1992. DOI: 10.1016/0140-6736(92)93147-f Coretti, 2002. DOI: 10.1016/s0735-1097(01)01746-6 Thijssen 2019. DOI: 10.1093/eurheartj/ehz350 Ghiadoni 2012. DOI: 10.1097/HJH.0b013e328353f222</p>

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<https://vascagenet.eu/feedback-for-official-glossary-of-key-terms>

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