Abstract

The vascular endothelium plays an important role in the regulation of vascular tone, cell growth, inflammation and thrombogenicity. Endothelium dysfunction is then considered to promote several disorders that initiate the atherosclerosis process. The vascular tone dysfunction can be determined by high resolution ultrasonographic imaging of the brachial artery enabling to assess endothelium-dependent flow-mediated dilation (FMD). It is based on the principle that an increase in blood flow, specifically in shear stress, provokes the release of nitric oxide, and then a vasodilation that can be quantified. In this study, the brachial artery diameter evolution is continuously followed during baseline and hyperemia after forearm occlusion, using a custom designed software. Some techniques employed to measure FMD are limited by operator-dependence. We present a new automated and versatile method of flow-mediated vasodilation quantification based on B-mode echographic images and edge detection algorithms. Edges for each image in the acquired sequences are recognized as interfaces, based on the grey-level profiles of the averaged pixel values. Within-reading and within-subject FMD% coefficients of variation attained 7% and 10% respectively. This technique largely improves manual measurements and shows to be appropriate for wide clinical use.

Keywords
Flow mediated vasodilation, Ultrasonography, Endothelium, Age