P2.20: ASSESSMENT OF THE CAROTID DIAMETER AND INTIMA-MEDIA THICKNESS FROM ULTRASOUND DATA: COMPARISON BETWEEN TWO METHODS

E. Bianchini, E. Bozec, V. Gemignani, F. Faita, C. Giannarelli, P. Boutouyrie, S. Laurent, M. Demi


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VALIDATION OF A NEW SYSTEM FOR THE ASSESSMENT OF FLOW MEDIATED DILATION: COMPARISON WITH A REFERENCE METHOD

P. Faita 1, S. Loukogeorgakis 1, V. Gemignani 1, M. Okorie 1, E. Bianchini 1, L. Ghiaidoni 1, J.E. Deanfield 2, M. Demi 3

1 Institute of Clinical Physiology, Pisa, Italy
2 Department of Clinical Medicine, University of Pisa, Pisa, Italy
3 Vascular Physiology Unit, Institute of Child Health, London, United Kingdom

Esaote Spa, Firenze, Italy

Endothelial function is linked to cardiovascular risk factors, provides prognostic information when studied non-invasively by measurement of flow-mediated dilation (FMD). Despite the large effort to standardize the methodology, the FMD examination is still characterized by problems of reproducibility and reliability that can be overcome with the use of automatic systems. In our lab, we developed a system for the assessment of brachial FMD from ultrasound images which is able to automatically evaluate the brachial artery diameter in real-time. In order to validate our system, we carried out a comparison with another automatic method, available at the Vascular Physiology Unit of the Institute of Child Health (London), that it is considered as a reference method in FMD assessment. Two protocols have been followed in order to evaluate the agreement between the systems.

Protocol 1: 47 VCR recorded FMD sequences have been analyzed. Mean baseline (Basal), maximal (Max) brachial artery diameter and FMD, as maximal percentage diameter increase (%FMD) have been evaluated for each sequence.

Protocol 2: brachial artery diameter (Diam) has been evaluated in 618 frames from 12 sequences. Diam value and %FMD have been considered for each frame. Bland-Altman analysis has been used. As shown in the table, the bias is negligible and the SD of the differences is satisfactory. In conclusion, the compared systems show a optimal grade of agreement and they can be used interchangeably. Thus, the use of a system characterized by real-time functionalities would represent a referral method for assessing endothelial function in clinical trial.

<table>
<thead>
<tr>
<th>PROTOCOL 1</th>
<th>PROTOCOL 2</th>
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<tbody>
<tr>
<td>Basal</td>
<td>Max</td>
</tr>
<tr>
<td>Mean of Diff</td>
<td>-0.014 mm</td>
</tr>
<tr>
<td>SD of Diff</td>
<td>0.025 mm</td>
</tr>
</tbody>
</table>

Discussion: Currently used ultrasound imaging modalities have important limitations to assess complex flow in the carotid artery. This complicates the use of these images to extract quantitative data related to flow such as wall shear stress. This virtual ultrasound environment is a powerful tool to assess limitations of currently used ultrasound imaging modalities and to develop new algorithms of upcoming techniques such as 3D ultrasound.

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