Laser Doppler flowmetry in wearable implementation for the detection of arterial hypertension

Introduction

Arterial hypertension (AH) is characterized by increased blood pressure (BP). It is completely asymptomatic, especially at a young age. It is necessary to wear a BP monitor during the day to detect it. The development of new, simple, affordable method for diagnosing and characterization AH is a task of great practical interest for the individual treatment and management of the common disease.

Aimed

To study the applicability of wearable LDF monitors to detect the features of the microcirculatory bed associated with AH.

Materials & Methods

The study included presumably healthy 89 volunteers aged 27 to 69 years (44.7 ± 9.7). The participants were divided into two groups according to the European Society of Cardiology recommendations, depending on the office BP and ambulatory BP monitoring indicators.

Sample characteristics

<table>
<thead>
<tr>
<th>Sample characteristics</th>
<th>1 group (Normal BP)</th>
<th>2 group (AH)</th>
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</thead>
<tbody>
<tr>
<td>Number of volunteers</td>
<td>30</td>
<td>59</td>
</tr>
<tr>
<td>Age, years</td>
<td>43.4 ± 9.8</td>
<td>45.5 ± 9.7</td>
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The study used a wearable laser Doppler flowmetry monitor “AMT-LAZMA 1” (Aston Medical Technology Ltd., UK). The device was fixed on the back of the left wrist 2-3 cm above the ulnar styloid process.

Results

A decrease in the contribution of cardiac and endothelial mechanisms of blood flow regulation may indicate vascular constriction in volunteers from the 2 group with AH, which may indicate an increase in BP.

A decrease in the amplitude of myogenic oscillations in the 2 group implies an increase in the muscle tone of the precapillaries, which regulates nutritive blood flow.

Conclusion

✓ The tested method is promising for assessing the functional state of blood vessels and for identifying the features of microcirculatory blood flow regulation in AH.
✓ The study suggests new non-invasive markerks for the early detection of AH by the new wearable laser sensors.
✓ The method proposes an insight to the reason of the AH for an individual and can be used for an optimised treatment.

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