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ASSESMENT OF THE MULTI PHOTODIODE ARRAY (MPA) FUNCTIONALITY– PREMILIMINARY RESULTS

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ABSTRACT

INTRODUCTION In the Netherlands, approximately 1 million people suffer from heart and vascular diseases. Early detection of vascular disease could reduce future medical costs and improved the quality of life. Therefore there is a need for a non-invasive and affordable indicator of vascular disease. Such a potential indicator of vascular disease is the values of Vascular Transit Time (VTT). The VTT is the time a pulse wave (PW) needs to travel across a predefined distance and is commonly determined by measuring the PW on two locations by two separate photoplethysmography (PPG) sensors. We built a novel multi photodiode array sensor ("MPA-sensor") that enables measuring, amongst others, the VTT with a single sensor that can be placed on a finger or toe. The MPA-sensor contains an array of photodiodes, each functioning as an independent PPG-sensor. The information obtained with the MPA-sensor can be used to non-invasively obtain an indication of the vessel conditions in the patient and for monitoring purposes during surgery. The goal of the current study is to evaluate the feasibility, reliability and repeatability of VTT measurements obtained with the MPA-sensor.

METHODS The VTT is measured in 25 subjects on the finger using the MPA-sensor. The subjects are healthy volunteers without cardiovascular or other disease affecting vasomotor functioning or injuries at the limbs, aged 20-30 years. Baseline measurements are performed for 5 minutes while the subject are sitting relaxed on a chair. Next, the subject is standing upright and the VTT is measured for another 5 minutes. For the next 5 minutes, the VTT is measured with the subject lying down. Finally, the baseline measurement is repeated to determine the repeatability.

RESULTS PWs proved to be clearly measurable. The preliminary results based on the first inclusion shows the VTT was 8.36±3.89ms during sitting.

CONCLUSION The novel MPA-sensor and the data-analysis showed to function properly. Reproducibility and variance data will be available after measuring the rest of the subjects in June 2012. Tracking the VTT with the novel MPA-sensor may enable simple, quick, and cost-effective monitoring during surgery and diagnosis of vascular disease.

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