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Monitoring the personalised effects of antihypertensive drugs using the Aktiia optical device: a 4-month follow-up

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Summary

The reduction of blood pressure is associated with a significant reduction of cardiovascular events and all-cause mortality. After lifestyle interventions, antihypertensive drugs are routinely administrated to lower blood pressure. The optimisation of antihypertensive therapies requires the identification of the best-adapted drugs for each patient, followed by the titration of doses or by the combination of drugs. Automated cuffless blood pressure monitoring devices based on optical sensors have the potential to provide new insights in the daily monitoring of the effectiveness of antihypertensive therapies over weeks. This case report illustrates the use of the CE-marked Aktiia Bracelet optical device for the monitoring of a 39-year-old male hypertensive patient for 4 months during which two drug therapies were tested.

A particular field of interest in hypertension is the monitoring of blood pressure changes during the administration of antihypertensive drugs. It is well known that different patients may respond differently to different types of medication [1]. The adjustment of a therapy is supported by sparse and incomplete data that are normally self-reported by the patients, but there is evidence that quicker titration maximises the effect of the therapy and reduces the time taken to reach blood pressure reduction goals [2].

The Aktiia Bracelet is a CE-marked medical device intended to monitor blood pressure intermittently for 24 hours and for several consecutive days or weeks [3]. After an initialisation procedure with an oscillometric cuff, this optical device generates blood pressure estimates during the day and the night without any user interaction: patients do not need to press a button to trigger a measurement (automatic triggering), and do not notice that a measurement is performed (cuffless measurement). Because the reading of optical signals is automatically triggered at the wrist with no user interaction, blood pressure is estimated in different body positions and with different vertical distances between the wrist and the heart. The Pulse Wave Analysis algorithms of Aktiia Bracelet have thus been developed to provide blood pressure estimations that accurately match manual auscultatory blood pressure readings while being independent of the actual body position and associated hydrostatic pressure drops. The accuracy of the medical device has been tested in several clinical environments such as intensive care units [4] and ambulatory settings [5], and fulfils the requirements of criterion 1 and criterion 2 of ISO81060-2 standard in the standard sitting position. In particular, the NCT04027777 pivotal trial addressed the accuracy of the device in body positions such as sitting, lying and standing, and while performing physical activity, demonstrating the device to be accurate for the monitoring of blood pressure in typical real-life settings [5].

A major breakthrough of the Aktiia Bracelet is that it combines the advantages of ambulatory blood pressure monitors (i.e., the monitoring of blood pressure during awake and sleep periods) with the advantages of home blood pressure monitors (i.e., the monitoring of blood pressure over longitudinal examination periods of several weeks), in addition to improving patient adherence (i.e., improved comfort and inconspicuousness). The Aktiia Bracelet has thus the potential to provide new insights on long-term circadian regulation of blood pressure for patients in the ambulatory setting.

This case report presents real-world evidence on how the automated optical blood pressure monitor Aktiia Bracelet can measure the effects of different hypertensive drugs over several days to weeks in ambulatory settings.

The evolution of systolic and diastolic blood pressure values of a 39-year-old newly diagnosed hypertensive male patient over a 4-month period, as recorded by Aktiia Bracelet, is illustrated in figure 1. Written informed consent to publish anonymised data was obtained from the patient.

Treatment with the enalapril 10 mg/day resulted in fall of mean systolic blood pressure from 155 ± 2 mm Hg to 148 ± 3 mm Hg, but had almost no effect on mean diastolic

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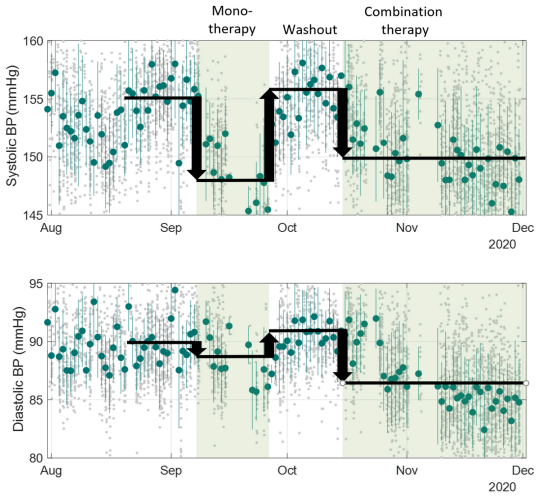
blood pressure (fall from 90 ± 2 to 89 ± 3 mm Hg). After a wash-out period of 2 weeks, a fixed combination therapy (perindopril 10 mg/day + amlodipine 5 mg/day) resulted in fall of systolic blood pressure from 156 ± 2 to 150 ± 3 mm Hg, and of diastolic blood pressure from 91 ± 1 to 86 ± 3 mm Hg.

Figure 1: Systolic and diastolic blood pressure as estimated by Aktiia Bracelet for 4 months. The effect of two hypertensive strategies are seen in the green areas. Small dots represent all the blood pressure measurements, which were automatically triggered and recorded by the cuffless device. Bold dots represent the averaged blood pressure values over 24 hours, i.e., pooled measurements over one day and one night. Vertical lines represent daily standard deviations of blood pressure.



This case report illustrates how new technology with cuffless devices may change the way we manage our hypertensive patients in a more personalised way. The Aktiia Bracelet provides new insights into the out-of-office monitoring of antihypertensive therapies over several weeks, a strategy that is encouraged by cardiology and hypertension guidelines [1].

Disclosure statement

Josep Soal and Sibylle Fallet are employees of Aktiia SA; Gregoire Wuerzner reports no conflict of interest relevant to this article.

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