



ASX ANNOUNCEMENT

14 October 2019

Blumio Update - Completion of Deborah Study & Progression to Data Analysis. Phase 3 of Joint Development Agreement Completed.

I wanted to update my fellow shareholders on the progress of both the Deborah Heart & Lung Study for the Blumio sensor. **as well as current activities and progress under the Joint Development Agreement between the Parties.**

Deborah Heart and Lung Study Update

As shareholders are aware, Blumio commenced BP data extraction from patients at the Deborah Heart & Lung Center in November 2018. The objective of the study was to compare traditional blood pressure (BP) data output (through an invasive arterial line) with Blumio's sensor algorithms and to use that data to refine Blumio's algorithms for clinical use.

I am happy to report that the research team at Deborah has now successfully collected reference blood pressure data from study subjects sufficient to finalize the study and begin data analysis. Accordingly the Deborah study period has now ended.

The completed data extraction now allows Blumio to immediately begin data analysis from the ~800 BP signals that were extracted and commence refinement of the BP algorithms - an important milestone in the development process.

JDA Activities Update

Shareholders are also aware that we also have a separate 50/50 Joint Development Agreement ("JDA") with Blumio in respect of joint development activities surrounding a combined BP and cBP wearable device. This is separate to our equity ownership in Blumio.

Our present focus under the JDA is to use the Blumio sensor to non-invasively measure three commercial use-cases:



1. Arterial age, exercise capacity, and cardiac load (i.e. a “Quantified Athlete” use case);
2. Estimation of BP and cBP values using a one-time calibration (i.e. a 24-hour continuous blood pressure/ABPM use case); and
3. Continuous BP and cBP values estimation (i.e. a “cuffless” use case for both BP and cBP).

The following update was provided in June 2019 with the exception of “Stage 3” which has now been completed. Stages 1 & 2 are reiterated in this release below for the purposes of clarity.

JDA Stage 1 – Macquarie University Trials - Completed

In the Macquarie University trial (previously announced to the ASX), CardieX and Blumio conducted 17 sessions across 15 subjects.

Each session contained 3 recordings and each recording is 3 to 5 minutes in length. Each recording was captured on different equipment for comparison purposes with the Blumio sensor having 64 channels of data that needed to be analysed. Ultimately this resulted in a minimum of 3,264 (i.e. $17 \times 3 \times 64$) channels of data that needed to be analysed.

During Phase 1 up to the end of March, 2019 we had processed 15 sessions (i.e. more than 2880 channels of data) and the following positive observations were made:

1. There are **observable changes** in the data that **corresponds to BP changes**; and
2. There are **observable differences between subjects** – which means it is theoretically possible to differentiate the blood pressure characteristics of each subject.

The Macquarie Trial compared Blumio’s radar sensor with a radial tonometer - the gold standard in measuring arterial motion and waveforms. The resulting paper was accepted for presentation at IEEE’s Body Sensor Conference in May 2019 – and was recently presented (as announced to the ASX). This was a critical step in commercializing Blumio’s sensor technology as it allowed Blumio to showcase their innovation in front of the main industry body in the field of physiological sensing.

In the paper Blumio demonstrated that the pulse pressure waveform from Blumio’s radar sensor contains features expected from a cardiovascular signal and is similar to a tonometer.



However, unlike a tonometer, Blumio's sensor does not touch or apply pressure to the measurement site.

A number of medical devices, including CardieX's Sphygmocor®, use the tonometer to acquire a cardiovascular signal which effectively means that Blumio's sensor can possibly be integrated into those devices as a replacement for the tonometer delivering a non-invasive blood pressure monitoring solution in a clinical setting.

Commenting on the Blumio sensor, **Professor Alberto Avolio from the Faculty of Medicine and Health Sciences at Macquarie University recently stated:**

"The Blumio sensor uses radar technology in combination with sophisticated signal processing and is able to detect the waveform of the blood pressure pulse from very small variations of the skin surface over an artery, typically the radial artery at the wrist. It is able to track changes in blood pressure and pulse waveform that occur with physiological tests such as the Valsalva manoeuvre. An important distinguishing feature of the Blumio sensor is that it is essentially contactless, and as such increases the potential applications of this type of sensor".

These initial results provided sufficient validation for us to move to the next phase under the JDA.

JDA Stage 2 – Refinement and Develop of Processing Algorithms - Completed

The next step "post Macquarie" was to quantify this distinction technically so an algorithm can be established which I am pleased to announce has been successfully completed and we can report:

1. Cardiex has successfully developed an algorithm to process Blumio sensor signals (select the channel) and produce central pressure (cBP) waveform and parameters. **This means that the Blumio wearable sensor can potentially replace a tonometer in one of our existing devices or any other device that uses a tonometer for BP readings; and**



2. CardieX has successfully identified the method to calibrate the Blumio signals with one-time off cuff BP measurement.

This means that continuous BP/cBP and their variability can be measured with the Blumio sensor – the first time this has been achieved before.

This was a significant and commercially material milestone for the Company.

JDA Stage 3 – Refinement and Develop of Processing Algorithms - Completed

Stage 3 under the JDA required CardieX to complete the porting of the reference signals to a “Desktop Demo App” that can display BP/cBP and central pressure waveform parameters using the CardieX developed algorithm. This stage has also now been completed and the Company is working on continuing refinement of the app and UI/UX - a significant milestone for all Parties.

Going forward, Blumio is improving their sensor and radar frequency algorithm to provide a stable and simplified output to CardieX, while CardieX continues to focus on collecting and analysing Blumio's output. Our aim is to further isolate this data and subsequently track its changes as BP/cBP varies which is a pre-requisite for the completion of the above goals and the development of a reference design for sensor commercialization.

Final Comments

I would remind shareholders that our R&D, studies, JDA, and other activities with Blumio are driven towards one ultimate goal – to prove out the equivalency and fidelity of signals from a wearable, non-invasive BP/cBP sensor, that we can jointly exploit in one of the biggest commercial opportunities in the med tech and consumer healthcare sectors

Thank you as always for your support,

Craig Cooper
Chief Executive Officer

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About CardieX

CardieX is a global health technology company that develops digital and device based solutions for large-scale population health disorders. The Company's XCEL device is the world leader in measuring "central blood pressure" which is considered essential for the management of hypertension and related cardiovascular disorders.

CardieX also has a joint venture partnership with Blumio, Inc in Silicon Valley for the development of a radar-based blood pressure sensor incorporating CardieX technology. In November 2018 CardieX entered into an agreement with inHealth Medical, Inc allowing CardieX to acquire up to 50.5% of inHealth by way of a convertible note.

In September 2019 CardieX signed a joint development agreement with Mobvoi Information Technology Co. Ltd (Google's official Wear OS partner in China) to jointly develop an ecosystem of "smart heart" and other consumer health applications for the Google Wear OS platform in China based on CardieX subsidiary, ATCOR, software and algorithms.