The Suitability of the CAVA Device as an Ambulatory Monitor for Detecting Dizziness

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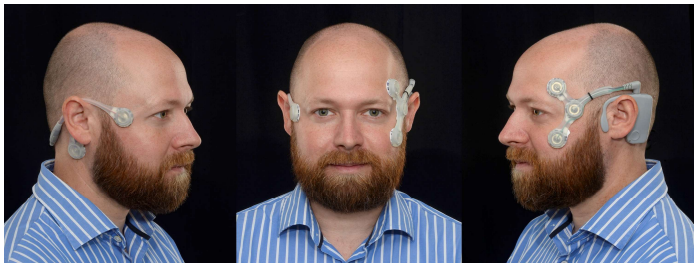
Introduction

- Dizziness is an increasing burden on health services. In England and Wales, symptoms of dizziness or imbalance are experienced by 30% of the population by the age of 65.
- Nystagmus is an abnormal eye-movement which accompanies dizziness caused by inner-ear malfunctions.



The CAVA Device

- The CAVA (Continuous Ambulatory Vestibular Assessment) device has been developed to monitor eye-movements over a period of thirty days.
- This concept reflects other ambulatory monitoring systems such as ECG and EEG.
- We undertook a clinical trial involving seventeen healthy subjects to test the device and our algorithms for detecting nystagmus.
- The healthy volunteers induced nystagmus by watching a 30s video on a virtual reality headset
- Participants who finished the trial completed a questionnaire requesting feedback on their experiences of wearing the CAVA device.

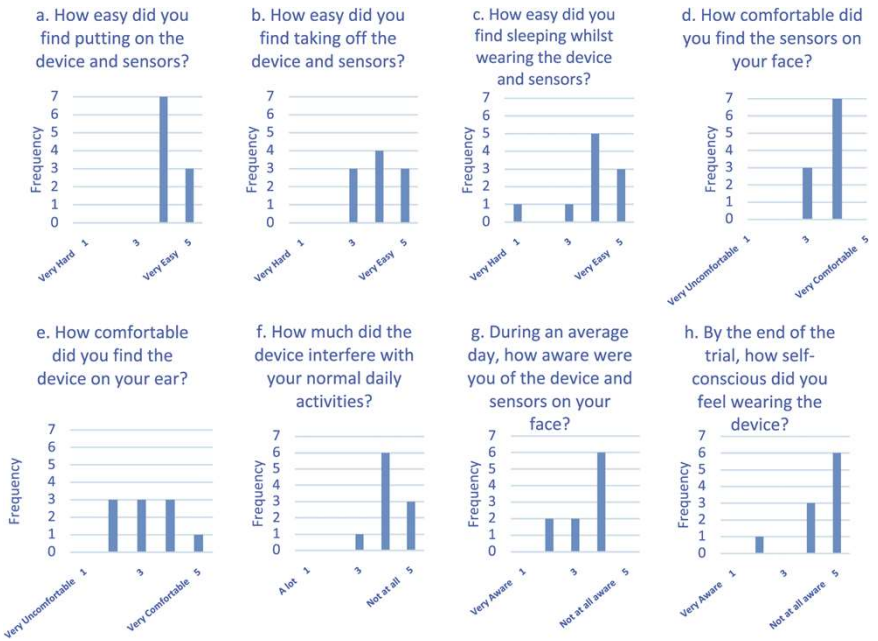
Trial Results

A formal, blinded analysis was conducted on the trial data, achieving a detection accuracy of 98.77%.

		Ground Truth: Nystagmus	Ground Truth: No Nystagmus	Total
Classification	Nystagmus	111	4	115
	No Nystagmus	1	289	290
	Total	112	293	405

TABLE I
CONFUSION MATRIX FOR IDENTIFYING FILES CONTAINING NYSTAGMUS.

Questionnaire Results



Conclusions

- The device was able to record artificially induced nystagmus from a range of participants, and our algorithms could detect these short bursts of 'dizziness' with a high degree of accuracy.
- The participants' questionnaire responses demonstrated acceptance of CAVA as an ambulatory monitor.
- A minor self-limiting skin complaint related to the device's electrodes was responsible for a reduction in overall acceptance. We have since rectified this issue.
- All participants found the device to be easy to put on and remove. They slept easily whilst wearing the device, and found the device to be comfortable to wear, although some reported discomfort over the ear. The device did not interfere significantly with daily activities and did not make participants feel self-conscious.
- Since this work in 2019, we have evaluated the device in patients with genuine vertigo and are about to embark upon a multi-centre clinical investigation exploring the device's capability to diagnose the common causes of dizziness.