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HypnosDx

Remote monitoring of hypersomnolence disorders

BACKGROUND

Hypersomnolence is a condition characterized by excessive daytime sleepiness (EDS) or the inability to stay awake despite frequent naps and consistent sleep.

Central Disorders of Hypersomnolence (CDH):

NARCOLEPSY TYPE 1 (NT1)	<ul style="list-style-type: none"> • Cataplexy (muscle weakness) • Clear hormonal biomarker
NARCOLEPSY TYPE 2 (NT2)	<ul style="list-style-type: none"> • No cataplexy • Unclear hormonal biomarker
IDIOPATHIC HYPERSOMNIA (IH)	<ul style="list-style-type: none"> • Long sleep periods, drowsiness • No hormonal biomarker

PROBLEM

The gold standard test for CDH is an overnight polysomnography (PSG) followed by a multiple sleep latency test (MSLT).

20% of MSLTs result in a false negative¹

>50% undiagnosed after MSLT²

Misdiagnosis **elevates risk** of health comorbidities and **decreases quality of life.**

NEED

Adults that have been prescribed an MSLT need a diagnostic aid that reduces the effects of environmental factors on data in order to stratify and treat a greater proportion of NT1, NT2, and IH patients.

Acknowledgements:

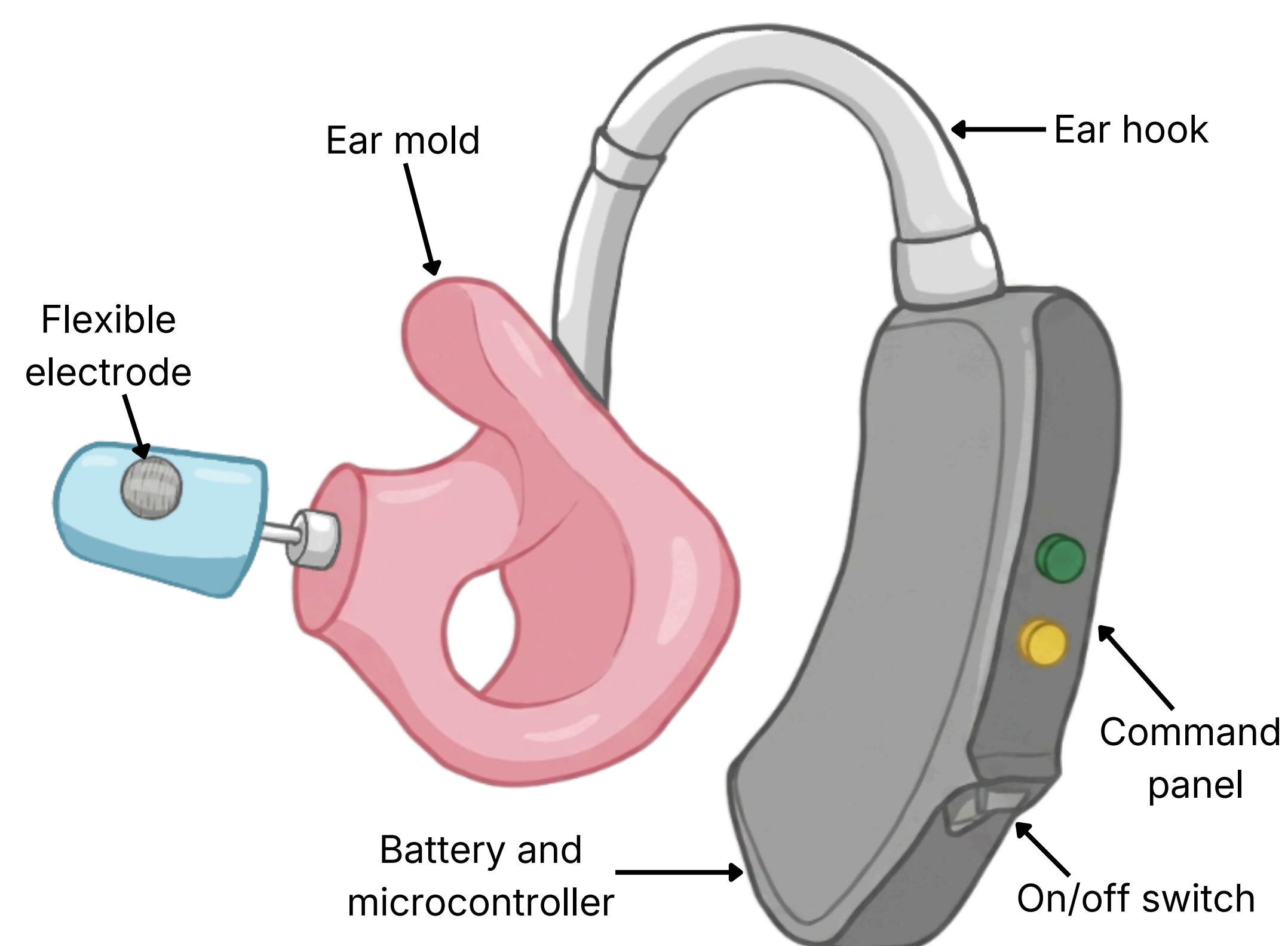
Adam Charles, PhD, Alessandro Ascani Orsini, Celia Logsdon, AuD, Kathryn Raplee, AuD, Kristin Bresnahan, AuD, Erik St. Louis, MD, Patrick Myers, DEng

References:

1. Cairns A, Trotti LM, Bogan R. Demographic and nap-related variance of the MSLT: results from 2,498 suspected hypersomnia patients: Clinical MSLT variance. *Sleep Med.* 2019;55:115-123. doi:10.1016/J.SLEEP.2018.12.013
2. Trotti LM, Staab BA, Rye DB. Test-Retest Reliability of the Multiple Sleep Latency Test in Narcolepsy without Cataplexy and Idiopathic Hypersomnia. *Journal of Clinical Sleep Medicine.* 2013;9(8):789-795. doi:10.5664/JCSM.2922

OUR APPROACH

An in-ear electroencephalogram (EEG) device capable of **remote, continuous monitoring** of sleep metrics to facilitate identification and treatment of CDH (Fig. 1).



- Wireless, battery operated for recording up to 48 hours
- Soft in-ear piece conforms to ear canal
- Grips concha to provide support
- Movement resistant

Figure 1. In-Ear Electroencephalogram (EEG) Device Schematic. The device shall consist of electrodes inserted into the ear canal, capable of recording rapid eye movement (REM) and non-REM onset while worn by the patient.

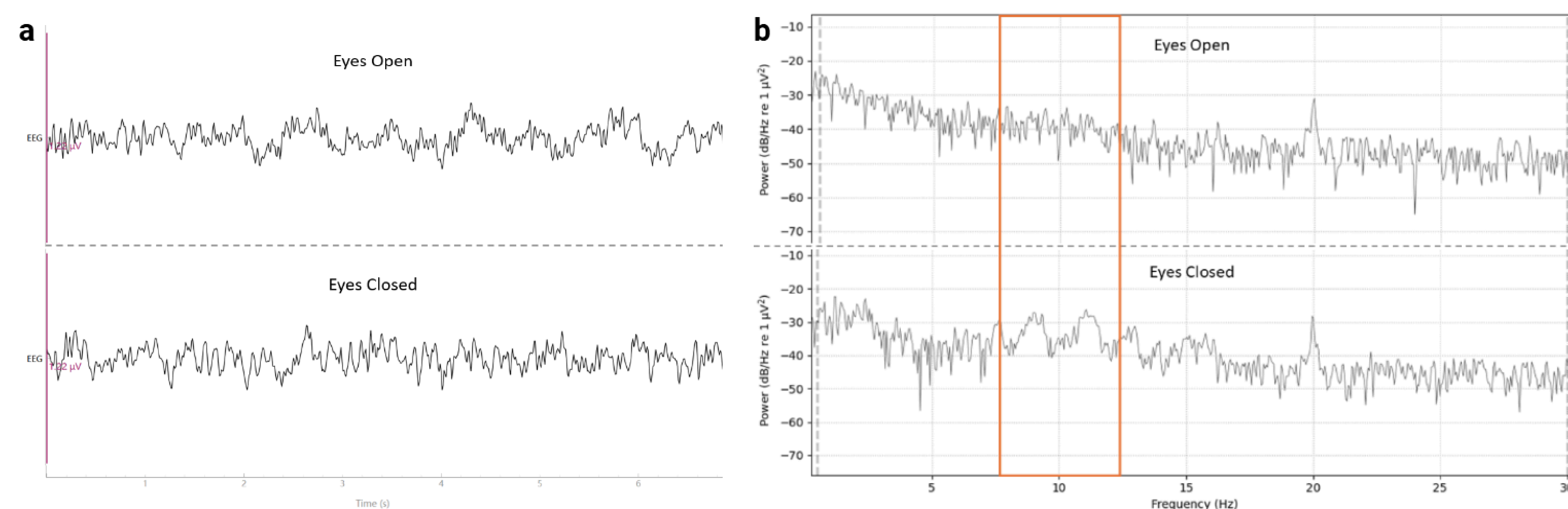


Figure 2. In-Ear EEG Signal With Eyes Open and Closed. (a) Filtered EEG signal for custom in-ear electrode for eyes-open condition (top) and eyes-closed condition (bottom). (b) Power spectral density (PSD) plots showing higher alpha band intensity (boxed in orange) during the eyes-closed condition.

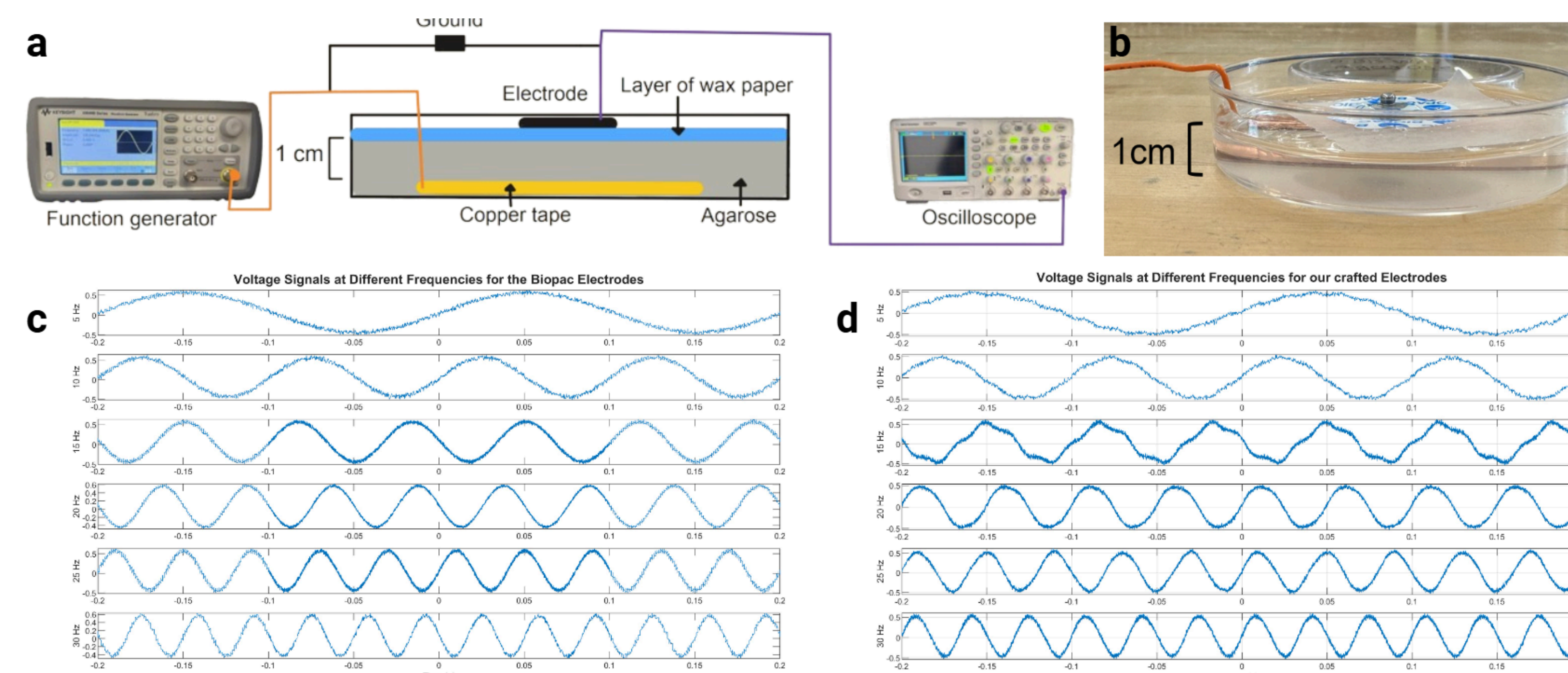


Figure 3. Comparison of Custom and Commercial Electrodes. (a) Testing setup diagram depicting skin phantom composed of layers of copper tape, one centimeter thick agarose gel, and wax paper. (b) Picture of petri dish setup. (c) Oscilloscope data from Biopac disposable electrode. (d) Oscilloscope data from custom stainless steel electrode.