

**INTRODUCTION**

In hearing aids, the most common batteries are zinc-oxide because of their small size and precipitous slope in output once the battery begins to die.<sup>1</sup> Once the voltage of the battery is below one volt, typical hearing aids will turn off or begin to falter. However, manufacturers assert that there should be no change in functioning with regards to programming while voltage is decreasing<sup>2</sup>

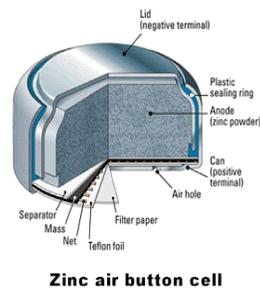


Figure 1. Cross Section of a Zinc-Oxide Battery<sup>3</sup>

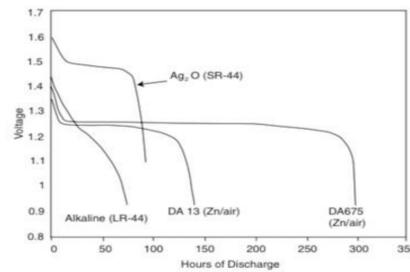


Figure 2. Battery voltage as a function of hours of discharge<sup>4</sup>

In contrast, thirty- six percent of hearing aid users report being between "somewhat" or "totally dissatisfied" with their hearing aid battery life<sup>5</sup> Satisfaction ratings were not found to be impacted by size or style for behind the ear (BTE), or mini BTE hearing aid users<sup>6</sup>

In addition, as disposable batteries persist in the market place, they warrant investigation given that technology in hearing devices continues to change with an emphasis on more advanced signal processing that is likely to demand more battery power.

Further research needs to look at the objective performance of batteries in the functional setting.

**PURPOSE**

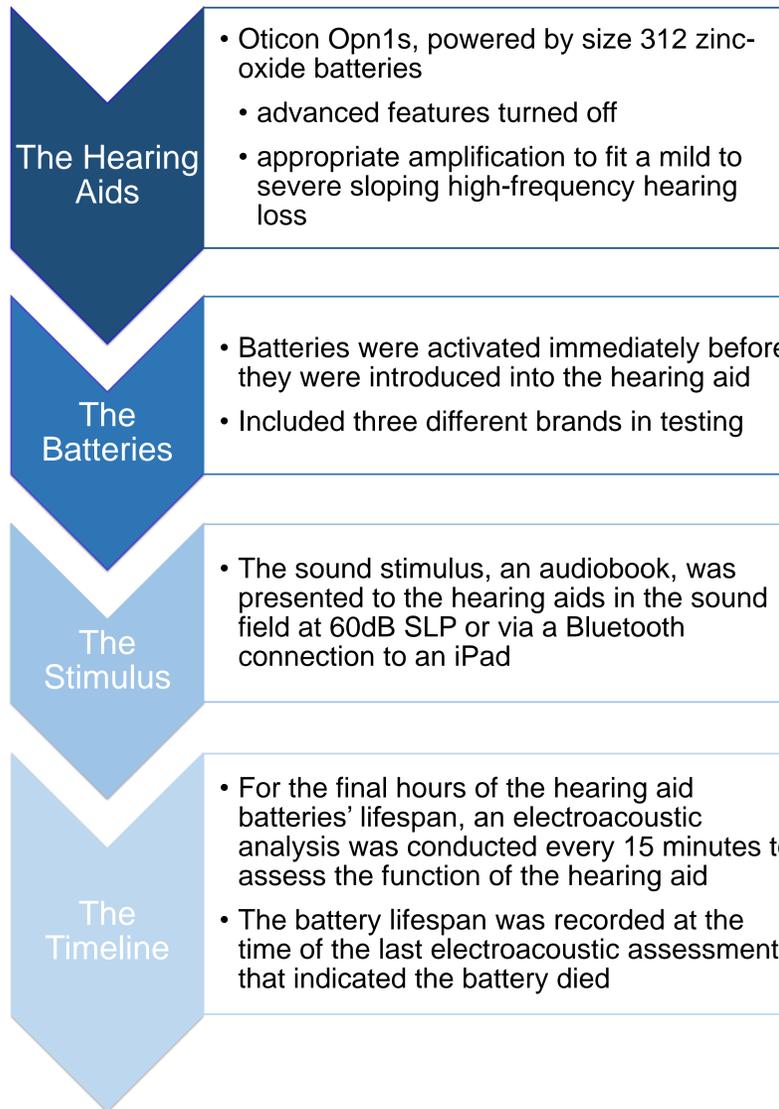
This study investigated the impact of **streaming** on the lifespan of zinc-oxide disposable hearing aid batteries from three different manufacturers.

The goal was to begin looking at the objective functioning of hearing aid batteries based on standard devices, programing, stimuli, and audiograms as a function of battery manufacturer.

Hypotheses:

- Hearing aid battery life will be equivalent to five - seven days of wear when in the sound field.
- Streaming audio to the devices will decrease battery life by approximately one half.

**METHODOLOGY**



**DISCLOSURE**

This study was supported by a grant awarded from Duracell to K. Cienkowski.

**REFERENCES**

<sup>1</sup>Dillion, H. (2012). Hearing aids (2nd edition). New York, NY: Thieme Publishers.  
<sup>2</sup>Personal communication with Oticon, Phonak, Starkey, 2015  
<sup>3</sup>Battery Facts. Retrieved from <http://www.batteryfacts.co.uk/BatteryTypes/HearingAidBatteries.html>  
<sup>4</sup>Linden, D., & Reddy, T. B. (2002). Handbook of Batteries, 3rd edition.  
<sup>5</sup>Kochkin, S. (2010). MarkeTrak VIII: Consumer satisfaction with hearing aids is slowly increasing. The Hearing Journal, 63(1), 19-27.  
<sup>6</sup>Kochkin, S. (2011). MarkeTrak VIII: Mini-BTEs tap new market, users more satisfied. The Hearing Journal, 64(3), 17-24.  
<sup>7</sup>Bailey, A. (2016). Hearing aid Batteries – How Long Do They Really Last? And How Much Do They Cost in 2018? Retrieved from <https://www.hearingtracker.com/blog/hearing-aid-batteries-how-long-do-they-really-last/>

**RESULTS and CONCLUSIONS**

Results are consistent with reports of average hearing aid battery life<sup>7</sup>

Significant differences were not noted across manufacturers in sound field and streaming conditions.

Results suggest that factors other than battery brand impact differences in individual client and device run times.

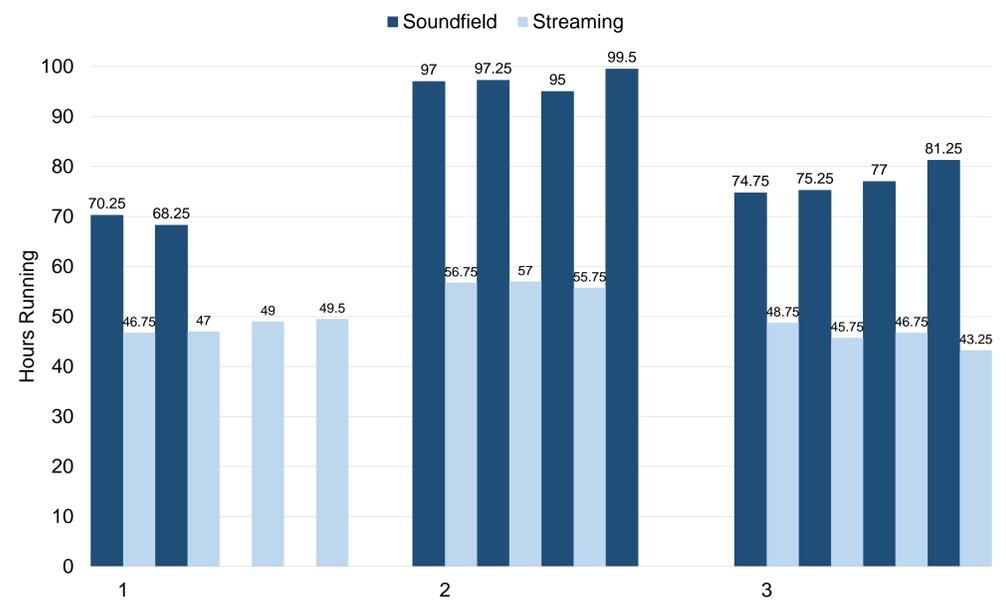


Figure 3. Hearing aid battery life by manufacturer.

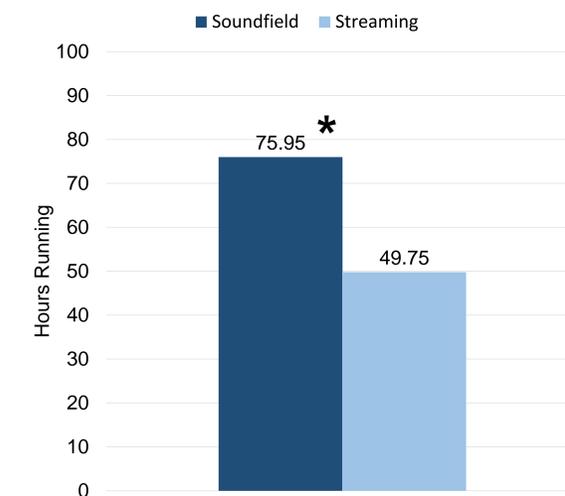


Figure 4. Average hearing aid battery life across manufacturers. Note.\* indicates significant difference at the p<.05 level.

The impact of streaming was observed at a significant level.

However, the degree of that impact was not to the level hypothesized.

Individual client battery management practices and the influence of advanced hearing aid features such as noise management are currently under investigation.