Cardiac Implant Sensitivity Adjustment May Mitigate Conducted Bioimpedance-Induced Interference from Consumer Devices

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Aim:

Cardiovascular disease risk and progression may be monitored through body composition. Modern smartwatches and smart scales use bioelectrical impedance analysis (BIA) to measure body composition, a method that may cause cardiac implantable electronic devices (CIED) pacing issues and unwarranted shocks. We conducted a single-center, prospective, pilot safety study to explore the in vivo impact of interference on CIEDs using the Samsung Galaxy Watch5 Pro and the Withings Body+ Scale.

Methods:

Patients obtaining CIED follow-up at the University of Utah Hospital Cardiovascular Center (Salt Lake City, Utah, USA) were screened for eligibility, and consenting patients were enrolled. The 27 participants' devices were initially set to maximum sensitivity. In 11 of 27 subjects, we decreased CIED sensitivity until myopotentials were no longer detected. We conducted BIA measurements with the watch and scale when the CIED was in unipolar configuration, and then again in bipolar configuration, if available. After measurements, we restored the original CIED configuration. EGMs were annotated and independently reviewed.

Results:

We found interference from the smartwatch and smart scale in five of 27 patients. Of 16 patients with pacemakers, four patients with maximum sensitivity experienced noise reversion or oversensing (Boston Scientific models L311 and L331; RA: 0.15 mV, RV: 0.25 mV). Of nine patients with ICDs, one of five maximum-sensitivity patients experienced interference (Boston Scientific model D233; RA: 0.15 mV, RV: 0.25 mV). Two patients, one with CRT-D and one with CRT-P, experienced no interference. We found no interference in subjects with adjusted sensitivity (Table 1).

Conclusion:

These results indicate that BIA features in consumer health devices may pose a risk to patients with CIEDs, but this risk can be mitigated by appropriate adjustments to lead sensitivity. Further research is warranted to develop standardized approaches to safely integrate BIA measurements in patients with CIEDs.