Amusement Park Rides and Cardiac Devices: Heart Dropper or Device Stopper?

ALEXANDER JOHNSON, BS[A]; MIA KASSAB, BS[B]; DANIA KALLAS, MS[B]; SONIA FRANCIOSI, PHD[B]; JEFFREY BONE, PHD[B]; SAKETHRAM SARAVU VIJAYASHANKAR, MD[B]; SHUBHAYAN SANATANI, MD[B]

[A] University College Cork, Cork, Ireland

[B] BC Children's Hospital, Vancouver, Canada

https://doi.org/10.33178/SMJ.2025.1.24

Abstract

BACKGROUND: Cardiac implantable electronic devices (CIEDs) are essential for managing cardiac conditions, but may malfunction due to magnetic fields >10,000mG. Roller coasters using linear induction motors (LIMs) generate magnetic fields, yet their potential for electromagnetic interference (EMI) with CIEDs is unclear. This study assesses magnetic field exposure on amusement rides and examines healthcare provider recommendations.

METHODS: Magnetic field strength was measured using gaussmeters placed at shoulder and abdomen levels, representing pediatric CIED sites. Rides at an amusement park were tested at least four times, recording median and maximum magnetic field strengths per second throughout the ride. Magnetic field strengths were compared between rides with health advisory messages (HAMs) and without (NHAMs). A survey was distributed to the Pediatric and Congenital Electrophysiology Society (PACES) and the Canadian Council of Cardiovascular Nurses to assess healthcare provider recommendations.

RESULTS: A total of 15 rides were sampled: 11 with HAMs and 4 with NHAM. The median magnetic field strength was higher for HAM rides (2.9mG) than NHAM rides (1.6mG; p=0.05). Maximum field strength was also greater in HAM rides (46.4mG vs. 6.5mG; p<0.001), and in rides using LIMs (n=2) compared to those using other mechanisms (211.7mG vs. 7.8mG; p<0.001). Only 18.1% (n=13) of healthcare providers relied on published resources for amusement park ride recommendations, while 58.3% (n=42) advised patients to consider HAMs.

CONCLUSION: Magnetic field strengths on all rides were clinically insignificant, posing minimal EMI risk for CIED patients. Further validation and standardized guidelines are needed to inform healthcare recommendations for patients with CIEDs.