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Life Saving Therapy Inhibition by Phones Containing Magnets

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Life Saving Therapy Inhibition by Phones Containing Magnets

Implantable Cardioverter Defibrillator (ICD) remains the cornerstone therapy in the management of malignant ventricular arrhythmia's for patients with high risk cardiac conditions. An ICD system contains a battery, capacitors, sensing/ pacing circuit together with an intra-or extra-cardiac lead. All ICD's have an in-built switch (Reed switch, Hall-effect sensors, Giant magneto sensitive resistors or coils) which respond to an externally applied magnetic field. When an external magnet is applied to a defibrillator, high voltage shock therapy for ventricular tachycardia and ventricular fibrillation is suspended. It has been estimated that a magnetic field stronger than 10 Gauss is strong enough to activate these switches. (1)

Recently, Apple Inc. launched the iPhone 12 series which has a circular array of magnets around a central charging coil for the phone to be compatible with "MagSafe" accessories. MagSafe technology contains a magnetometer and single coil Near Field Communications (NFC) reader. The magnets aids in properly aligning the iPhone on a wireless charger and other peripheral accessories and increases wireless charging speeds (up to 15 Watts). The first author (JG) raised the concerns for possible device-device interaction due to presence of a strong magnetic array in the iPhone and MagSafe compatible cases. We thus tested this interaction on a patient with a Medtronic Inc. (Minneapolis, MN, USA) ICD. Institutional Review Board approved the study. Once the iPhone was brought close to the ICD over the left chest area, immediate suspension of ICD therapies was noted which persisted for the duration of the test. (Figure 1) This was reproduced multiple times with different positions of the phone over the pocket.

We hereby bring an important public health issue concerning the newer generation iPhone 12 which can potentially inhibit lifesaving therapy in a patient particularly while carrying the phone in upper pockets. Contemporary studies have shown minimal risk of electromagnetic interference with ICDs and prior

smartphones without magnetic arrays.(2) (3) A recent case report highlighted magnetic interference with a fitness tracker wrist band deactivating an ICD up to distances of 2.4 cm. [4] Apple Inc. website does mention magnetic interference with medical devices and prior consulting with physician and medical device manufacturers. [5] Medical device manufacturers and implanting physicians should remain vigilant in making patients aware of this significant interaction of the iPhone 12 and other smart wearables with their cardiac implantable electronic devices.

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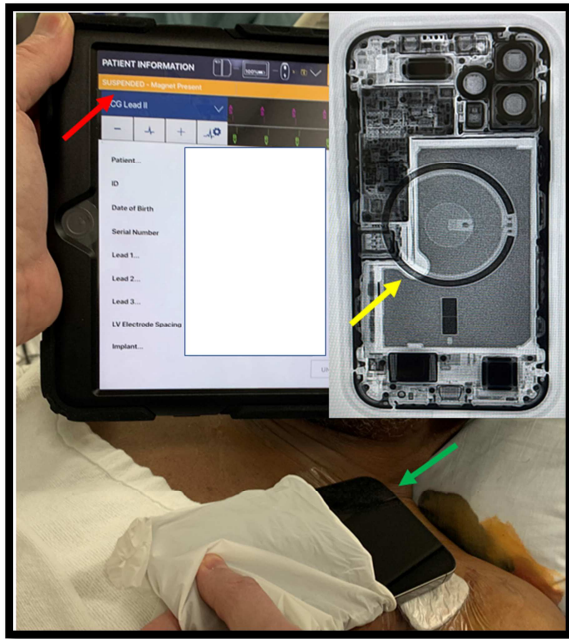


Figure 1: Device Programmer showing suspension of ICD therapies (orange bar, red arrow) with iPhone 12 laying over patient's chest (green arrow) and Fluoroscopy of iPhone 12 showing the circular magnet array (yellow arrow)

