CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Gianna G. Chien

Project Number

S1203

Project Title

EMIT: Does iPad Use in Patients with Implantable Cardiac Rhythm Devices Cause Electromagnetic Interference?

Abstract

Objectives/Goals

The goal of this study is to determine if the iPad with embedded magnets can cause electromagnetic interference in patients with Implanted Cardiac Rhythm Devices (ICRDs), which include pacemakers, defibrillators, and loop recorders.

Methods/Materials

This study is approved by the Internal Review Board of Dignity Health. Human subjects with ICRDs were studied. The iPad 2 's effects were studied with its cellular data on and off, on the ICRD's original programming settings, and again on the most sensitive programming settings. Subjects held the iPad 2 at reading distance, then on their chests to mimic falling asleep while using the iPad. Variables collected included the device manufacturer, model, patient sex and Body Mass Index

Results

A total of 30 patients were studied including 25 subjects with defibrillators, four with pacemakers, and one with a loop recorder. The main finding of this study is that, in 7 out of 25 subjects with defibrillators (28%), magnet mode was triggered by the iPad 2. This indicates suspension of anti tachycardia therapy. No effect was seen in pacemakers or loop recorders. No over sensing due to cellular data was noted.

Conclusions/Discussion

The iPad 2 can trigger magnet mode in defibrillators and therefore suspension of anti tachycardia therapy. Other devices with embedded magnets are likely to cause similar interference. With the aging of the United States population, it has been projected that there will be an increase in ICRD placement. As new electronic products that utilize magnets are produced, a new public health issue arises and should be addressed. Manufacturers should consider that magnets can potentially stop ICRDs from performing the function for which they were designed. This can lead to failure to deliver lifesaving shocks or even death.

Summary Statement

My project investigates whether or not iPad use is safe in patients with Intra Cardiac Rhythm Devices (ICRDs).

Help Received

Used father's office. He provided the materials. Representative from device companies worked with the programmer. Advisor, Teri Kozik, advised in data analysis. Mother helped with board.