Researchers at the University of South Florida have developed a novel new pacemaker stylus and lead/deep brain stimulator (DBS), that is safe for use with magnetic resonance imaging (MRI).

Early diagnosis for many diseases can mean the difference between life and death for the patient. Many non-invasive imaging techniques have been developed to help provide diagnostic capabilities. The efficiency of the diagnostic is dictated by the quality and specificity of the imaging technique. Most of these imaging techniques create a very low resolution image requiring extensive interpretation. Magnetic resonance imaging, however, exposes the scanned individual to high level magnetic fields (3 T to 7 T or higher) that are used to produce a very detailed image of the target tissue.

Many implantable biomedical devices use electromagnetic (EM) waves to provide therapeutics and sensing capabilities. Two such devices are deep brain stimulation devices and heart pacemakers. A major issue with these types of implantable biomedical devices, is that they produce dangerous levels of heating when exposed to typical MRI fields. Although many of these devices can withstand lower levels of MRI (maximum of 1.5T), the images produced at these lower power levels do not have adequate resolution needed to diagnose many diseases or symptoms.

Inventors at USF have designed a MRI compatible deep brain stimulator/pacemaker stylus and leads using silicon carbide. Not only does this material provide the necessary biocompatibility and resilience for permanent implantation, but it has the ability to dissipate the heat generated when subjected to the MRI field, allowing it to operate within normal (3T-7T) magnetic fields. The device is modular and constructed not only to provide stimulation, but also recording capability for closed loop.

ADVANTAGES:
- Can operate within normal (3T-7T) magnetic fields
- Biocompatible for permanent implantation
- Provides recording capability
- Modular

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