Patients with active implants such as deep brain stimulation (DBS) devices are often denied access to MRI due to safety concerns associated with the radiofrequency (RF) heating of their electrodes. The majority of studies on RF heating of conductive implants have been performed in horizontal close-bore MRI scanners. Vertical MRI scanners which have a 90° rotated transmit coil generate fundamentally different electric and magnetic field distributions, yet very little is known about RF heating of implants in this class of scanners. Kazemivalipour et al. performed numerical simulations as well as phantom experiments to compare RF heating of DBS implants in a 1.2T vertical scanner (OASIS, Hitachi) compared to a 1.5T horizontal scanner (Aera, Siemens).

Simulations were performed on 90 lead models created from post-operative CT images of patients with DBS implants. Experiments were performed with wires and commercial DBS devices implanted in an anthropomorphic phantom.

They found a significant reduction of 0.1 g-averaged specific absorption rate (30-fold, $P < 1 \times 10\text{-}5$) and RF heating (9-fold, $P < .026$) in the 1.2T vertical scanner compared to the 1.5T conventional scanner.

Vertical MRI scanners appear to generate lower RF heating around DBS leads, providing potentially heightened safety or the flexibility to use sequences with higher power levels than on conventional systems [1)]

Golestanirad L, Kazemivalipour E, Lampman D, Habara H, Atalar E, Rosenow J, Pilitsis J, Kirsch J. RF heating of deep brain stimulation implants in open-bore vertical MRI systems: A simulation study with realistic device configurations. Magn Reson Med. 2019 Nov 2. doi: 10.1002/mrm.28049. [Epub ahead of print] PubMed PMID: 31677308.

1)

Kazemivalipour E, Bhusal B, Vu J, Lin S, Nguyen BT, Kirsch J, Nowac E, Pilitsis J, Rosenow J, Atalar E, Golestanirad L. Vertical open-bore MRI scanners generate significantly less radiofrequency heating around implanted leads: A study of deep brain stimulation implants in 1.2T OASIS scanners versus 1.5T horizontal systems. Magn Reson Med. 2021 May 7. doi: 10.1002/mrm.28818. Epub ahead of print. PMID: 33961301.