

Deep Brain Stimulation Medical Safety Issues

You must alert all your health care providers that a deep brain stimulator is in place. When exposed to strong electrical fields, the deep brain stimulator system can carry unintended electrical energy capable of causing brain injury even if the system is turned off. It is important to always bring your patient programmer with you when you come into the hospital or the clinic.

Radiology:

- 1) Routine *MRI* is now allowed on SOME DBS devices under specific protocols. If any MRI is required, it should be performed only at an imaging center that is able to perform the scans using the specified protocols. UC Davis is one of a few institutions in the region that can perform MRI safely after DBS surgery.
 - a) Depending on the type of IPG (battery), there are specific protocols that must be followed that may require a temporary change to the programming settings during the MRI. Please call your DBS provider to clarify the protocol for your device. For the Abbott Infinity, Boston Scientific Vercise Gevia/Genus and Medtronic Percept DBS devices, place your programmer in "MRI" mode. Medtronic Activa devices require an MRI eligibility evaluation prior to the MRI. Please inform us of any upcoming MRIs ahead of time.
- 2) Regular *X-rays, CT, diagnostic ultrasound, & DEXA Scans* are allowed
 - a) For *diagnostic ultrasound*, do not place the transducer directly over the DBS device. DBS may need to be turned OFF to limit interference.
 - b) For *mammograms*, the radiologist should be experienced with doing mammograms on cardiac pacemakers as the devices are similar. The pads should be positioned/ rotated so as not to pull/place pressure on the device or lead extenders (wires).
 - c) For *CT*, radiation may increase stimulation during the procedure. If tolerated, turn OFF DBS during procedure.
 - d) No modifications are required for routine *x-ray* or *DEXA* scans

Diathermy (e.g., shortwave diathermy, microwave diathermy or therapeutic ultrasound diathermy): Diathermy, a form of treatment that delivers heat to tissue using an electrical energy, is **NOT ALLOWED!** Diathermy is used by a variety of healthcare professionals, including physical therapists, nurses, chiropractors, dentists, sports therapists, and others. Healthcare professionals may refer to diathermy using the term "deep heat" or similar terms. Diathermy's energy can be transferred through the implanted system (or any of the separate implanted components), which can cause neurostimulation system or tissue damage and can result in severe injury or death. These electrical devices (shortwave or therapeutic ultrasound diathermy) may cause damage even if no heat is created.

Dentistry:

- 1) Prophylactic Antibiotics: As of 2012, the American Dental Association (ADA) and the American Association of Orthopedic Surgeons no longer recommend antibiotic prophylaxis for everyone with orthopedic implants. Based on these guidelines, we no longer recommend antibiotics for everyone with DBS. However, your dentist may rely more on your personal medical history to determine when antibiotics are appropriate.
- 2) You may use electronic toothbrushes.
- 3) Ultrasonic cleanings are allowed only with the Abbott and Medtronic DBS systems if grounding pad is not placed on patient. Device may remain ON. Keep cord away from implanted device and machine as far away from patient as possible.
- 4) Manual Cleanings only for Boston Scientific DBS systems, no ultrasonic cleanings – if necessary, turn DBS off, use lowest setting possible on cleaner and keep device as far away from patient as possible.
- 5) If grounding pad is placed on patient or dentist has any concerns during a root canal procedure:
 - i) Abbott Infinity device: Place in Surgery Mode
 - ii) Medtronic/ Boston Scientific devices: Turn DBS OFF
- 6) Avoid focusing any energy or heat sources over the patient's implanted IPG in their chest/ abdomen. General EMI precautions should be taken: (Medtronic/ Boston Scientific- TURN DBS OFF. Abbott- Place in SURGERY MODE)
- 7) Electric drilling: No restrictions
- 8) Do not allow any cords to drape over your DBS device.

Security Devices & Traveling: Security devices will NOT harm your DBS; however, they may cause stimulation to switch ON or OFF and some patients may experience a momentary increase in perceived stimulation when passing through theft detectors and security screening devices. Security personnel at most airports will conduct a “pat-down” security check instead of requiring the DBS patient to go through the security gate. You may have to present your device identification card to airport security personnel prior to being screened. Always bring your patient programmer with you when you travel.

Mental Health: Depression, suicidal ideations and suicide have been reported in patients receiving DBS therapy for movement disorders, although no direct cause and effect relationship has been established. Please contact your DBS provider immediately if you note any change in your mental health.

Physical Activities: After incisions have completely healed, it is ok to perform all physical activities, except for those that may result in repeated hard blows to the device, e.g., American football, ice hockey, and boxing. Wear helmets for the activities you would normally have a helmet for, e.g., bicycling, skiing, snowboarding, and horseback riding.

Procedures: The Abbott Infinity device needs to be placed in “Surgery Mode” prior to ALL elective surgery. The other devices need to be turned OFF prior to procedures. A physician should document the DBS settings prior to surgery in case the device resets during the operation. If exposure of the DBS hardware is anticipated (e.g., wide excision of a skin cancer on the scalp) please notify our office prior to undergoing the procedure. Please encourage your provider to contact the device company directly to discuss the specifics of the procedure, should they have any questions.

- 1) *Electrocautery* (used to stop bleeding in surgeries) - For Medtronic and Boston Scientific devices, the DBS needs to be turned OFF. For Abbott Infinity devices, the DBS needs to be put in “Surgery Mode”. The surgeon needs to be contacted re: guidelines. Ideally, only bipolar electrocautery should be used. If needed, the grounding pad should be placed on the lower extremities.
- 2) Do not allow any electrical cords to be draped over your IPG (battery)
- 3) *ECG/ EKG* (electrocardiogram) or *EEG* (electroencephalogram) - Turn off DBS to avoid interference
- 4) No *lithotripsy* (treatment for kidney stones). This may damage the neurostimulator circuitry. If lithotripsy must be used, do not focus the beam within 15 cm (6 in) of the neurostimulator.
- 5) *Cardioversion* - Turn the device off. Some older devices need to be turned down to 0V.
- 6) *Colonoscopy* - Provider will follow electrocautery guidelines. The DBS may need to be turned off during the procedure.
- 7) *Cataract surgery* - Cataract surgery is considered safe and your DBS device can remain “on”.
 - a. If the ophthalmologist uses phacoemulsification (“ultrasound”, most common), they should work from the top of the head down. The surgeon should not lay anything across the chest
 - b. If they use laser, the surgeon should use caution to not direct anything towards the DBS equipment.
- 8) You may NOT have electroshock therapy or transcranial magnetic stimulation (TMS)

Disclaimer: This is a partial list of safety concerns. If you, your provider or your surgeon have specific questions about your DBS therapy, please contact our office or the device company’s technical services at:

- Abbott/St. Jude Medical at: (800) 727-7846
- Boston Scientific at: (888) 272-1001
- Medtronic at (800) 328 - 0810