**DEEP BRAIN STIMULATION**

(also known as “DBS”)

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**Is the initiation of non-invasive dental hygiene procedures* contra-indicated?** Yes, if there is the potential for electrical energy transmission or electromagnetic interference (EMI) from dental/dental hygiene equipment that could affect operation or safety of the implanted DBS system. (This would be unusual in the non-invasive procedure setting.)

- Is medical consult advised?
  - Yes, if unaddressed complications of, or technical complications with, DBS therapy are suspected.
  - Yes, if there are concerns with the underlying medical condition (e.g., Parkinson’s disease, epilepsy, or depression) for which DBS is being used. Immediate referral is indicated if suicidality is suspected. In particular, consultation may be warranted to determine the severity and stability of the patient/client’s medical condition(s), as well as to determine appropriate timing for dental hygiene treatment.

**Is the initiation of invasive dental hygiene procedures contra-indicated?** Yes, if there is the potential for electrical energy transmission or electromagnetic interference (EMI) from dental/dental hygiene equipment that could affect operation or safety of the implanted DBS system. Certain activities and equipment are to be avoided; see “Oral management implications” below.

- Is medical consult advised? ................................................................. See above.
- Is medical clearance required?
  - Yes, if there is the potential for equipment-related electrical energy transmission or electromagnetic interference that could affect operation or safety of the implanted DBS system.
  - Possibly, related to concerns with the underlying medical condition that led to implantation of the DBS system (e.g., if there are significant involuntary muscle movements in patient/client with Parkinson’s disease or if there is significant risk of seizure in patient/client with epilepsy).

- Is antibiotic prophylaxis required? ................................................. No, unless there are incidental co-morbid conditions that warrant such consideration (e.g., certain valvular heart conditions). A DBS system in and of itself does not typically require antibiotic prophylaxis.

- Is postponing treatment advised? .................................................... No, unless there are manifestations of the underlying disease entity that warrant better control before attempting procedures (e.g., significant involuntary muscle movements in Parkinson’s disease creating a safety concern for the dental hygienist and/or the patient/client), or if medical clearance is pending for clarification of equipment safety.

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**Oral management implications**

- The dental hygienist should enquire if deep brain stimulators are in place in patients/clients who have medical conditions for which DBS is sometimes used. This is a particularly relevant enquiry for Parkinson’s disease.

- When exposed to strong electrical fields, a DBS system can transmit unintended electrical energy that can cause brain injury even if the system is turned off.

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1 DBS also necessitates contraindications/restrictions/precautions/modifications with magnetic resonance imaging (MRI), diagnostic ultrasound, computed tomography (CT), mammograms, electrocardiograms (ECGs), electroencephalograms (EEGs), lithotripsy (ultrasound treatment for kidney stones), cardioversion, and colonoscopy.

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Oral management implications (cont'd)

- Electric dental drills or cleaning tools, as well as ultrasonic probes, should not be placed near the neurostimulator, extension connecting wire, or implant site on the scalp. Similarly, electrical cords should not be draped over the neurostimulator.
- Manual teeth cleaning should be performed instead of ultrasonic scaling in patients/clients with DBS systems.
- Dental radiographs may be taken without additional precautions.
- An electric toothbrush may be used by the patient/client.
- Diathermy (i.e., the use of high frequency electrical energy to deliver “deep heat” to tissue, which is sometimes used by dentists for treatment of pain) must never be used in a patient/client with a DBS system (regardless of whether the DBS system is turned on or off). The energy of diathermy (be it shortwave, microwave, or therapeutic ultrasound) can be transferred through the implanted DBS system (or any of the separate implanted components) and heat up the electrode leads, resulting in neurostimulation, brain tissue damage, stroke, and even death. Diathermy can also damage the neurostimulator implanted in the chest. Furthermore, diathermy electrical devices can cause damage even if no heat is created.
- Electrocautery (a form of electrical heat used to stop minor bleeding) should be used judiciously for dental surgical (and other surgical) procedures. The grounding pad should not be placed near the DBS device, and typically the voltage of the DBS device needs to be turned to zero. The DBS device should be turned off prior to all elective surgery. Bipolar electrocautery should be used to reduce transfer of electricity, and unipolar devices should be avoided.

Oral manifestations

- There are none due to DBS itself in the absence of complications.

Related signs and symptoms

- Deep brain stimulation is used to treat several neurological conditions, including:
  - Parkinson’s disease (“PD”, which is the most common indication);
  - epilepsy;
  - essential tremor;
  - Tourette syndrome;
  - dystonia;
  - chronic pain;
  - chronic headaches (migraine and cluster, as well as occipital neuralgia); and
  - obsessive-compulsive disorder.

In addition, DBS is being studied in the management of major depression, stroke recovery, dementia, and addiction.

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2 A ground lead is usually placed on one of the patient/client’s legs.
3 The DBS settings should be documented by a physician prior to surgery in case the device resets during the operation and re-programming is needed postoperatively.
4 Essential tremor is a neurological disorder that causes involuntary and rhythmic shaking, which usually occurs in persons over 40 years of age.
5 Tourette syndrome is a childhood-onset neuropsychiatric disorder characterized by multiple motor tics and at least one vocal (phonic) tic.
6 Dystonia is a movement disorder in which there is sustained, involuntary muscle contraction.
Related signs and symptoms (cont'd)

- DBS is increasingly being considered as an invasive treatment option for the 5% to 10% of Canadian patients/clients with Parkinson’s disease who qualify (i.e., patients/clients who improve to some degree after taking medication but whose signs/symptoms are not adequately controlled). Like drug therapy, DBS is not curative but rather aids management of debilitating motor signs/symptoms such as tremor, rigidity, stiffness, bradykinesia (slowed movement), and mobility problems. It is also useful in addressing motor complications of PD (some of which are related to use of dopaminergic medication), such as dyskinesia (involuntary writhing movement), dystonia, and “on/off” fluctuations. Non-motor symptoms such as mood, energy level, and sense of well-being may also show improvement.

- DBS involves implanting electrodes (“leads”) in certain areas of the brain. These electrodes give off electrical impulses that regulate abnormal brain activity. The amount of stimulation is controlled by impulses sent by a pacemaker-like, battery-operated device called a neurostimulator or implantable pulse generator (IPG, or “battery pack”), which is usually implanted under the skin of the upper chest near the clavicle. An insulated wire (“extension”) from this stopwatch-sized device traverses under the skin of the shoulder, neck, and head to connect to the electrodes in the brain. The system can be turned on or off by the patient/client or a clinician, and a DBS programmer (neurologist, neurosurgeon, or other trained health professional) can adjust a variety of electrical parameters.

- While risk of serious or permanent complications from DBS therapy is very low, there is a small risk of stroke from bleeding in the brain during implantation surgery. Hydrocephalus (excessive accumulation of fluid in the brain) is a rare complication, which may require a shunt to relieve pressure.

- Temporary or potentially reversible complications of DBS surgery or electrical stimulation include post-surgical infection in the brain, scalp, or chest; changes in mood, memory, and thinking; seizures (rare); problems with movement and speech; difficulty sleeping; and headache, dizziness, tingling in limbs and/or face, and jolting or shocking sensations. Adjustment of the programming and stimulation settings of the DBS system can alleviate or eliminate some of these complications.

- While not necessarily causally related, depression, suicidal ideation, and suicide have been reported in patients/clients receiving DBS therapy for movement disorders.

- Technical problems can occur with the DBS electrodes (e.g., migration from optimal target site in the brain), extension wire (e.g., fracture or disconnection), or neurostimulator (e.g., malfunction).

References and sources of more detailed information


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7 DBS is a potentially reversible procedure, usually with minimal damage to brain tissue.

8 Less commonly, the IPG is implanted lower in the chest or underneath abdominal skin.

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Disease/Medical Condition

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References and sources of more detailed information

- Parkinson Canada
  https://sencanada.ca/content/sen/committee/421/SONI/Briefs/2016-06-01-Brief_Parkinson_Canada_e.pdf (From Mobility to the Mind: A look at dementia in Parkinson’s disease. Brief prepared for the Senate Standing Committee on Social Affairs, Science and Technology, May 2016.)

- National Institute of Neurological Disorders and Stroke, National Institutes of Health
  https://www.ninds.nih.gov/Disorders/All-Disorders/Deep-Brain-Stimulation-Parkinsons-Disease-Information-Page

- National Institute of Mental Health, National Institutes of Health

- National Institute for Health and Care Excellence (NICE)
  https://www.nice.org.uk/guidance/ipg19 (Deep brain stimulation for Parkinson’s disease -- interventional procedures guidance)

- National Parkinson Foundation

- Parkinson’s UK
  https://www.parkinsons.org.uk/information-and-support/deep-brain-stimulation

- LSUHealth Shreveport, Department of Neurosurgery, Surgical Movements Disorders Clinic

- Mayo Clinic
  https://www.mayoclinic.org/tests-procedures/deep-brain-stimulation/home/ovc-20156088?p=1

- Emory University
  http://news.emory.edu/stories/2017/04/dbs_revised_targeting/index.html
  (Revised surgical targeting improves results of deep brain stimulation for depression)

- University of California, Los Angeles (UCLA)
  http://neurosurgery.ucla.edu/dbs/deep-brain-stimulation

- UCDavis Medical Center

- Beth Israel Deaconess Medical Center

* Includes oral hygiene instruction, fitting a mouth guard, taking an impression, etc.

** Ontario Regulation 501/07 made under the Dental Hygiene Act, 1991. Invasive dental hygiene procedures are scaling teeth and root planing, including curetting surrounding tissue.

Date: January 24, 2018