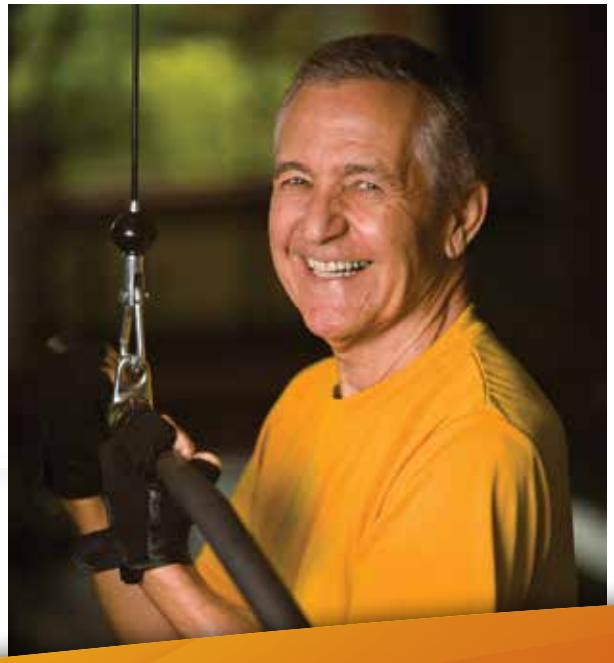
Asleep or Awake DBS:

Which option is for you?

Awake Deep Brain Stimulation (DBS) and Asleep DBS can help reduce the severity of symptoms related to movement disorders and obsessive-compulsive disorder. Use this guide to determine which option might be best for you.



This guide is meant to help you determine if you Awake or Asleep DBS may be right for you or a loved one. Our Patient Concierge is also happy to help answer any questions. Call us for a FREE phone consultation at 1.855.202.9303 (toll-free).

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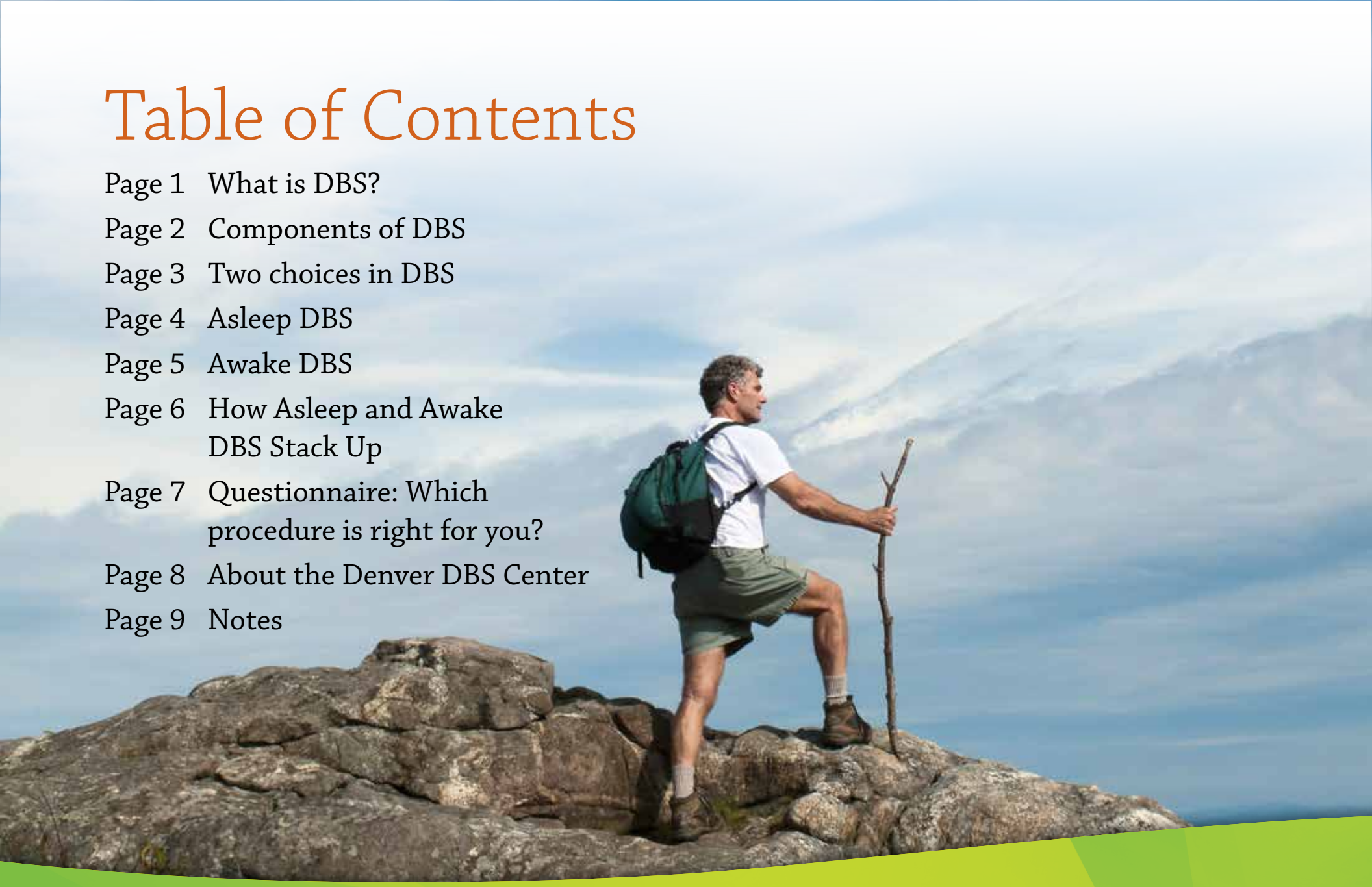

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What is DBS?

Deep brain stimulation (DBS) has benefited more than 100,000 patients over a quarter of a century. The DBS system sends electrical signals into one of three target areas of the brain that control movement: Subthalamic Nucleus-STN; Globus Pallidus pars interna-GPi; and Ventral Intermediate Nucleus of the Thalamus-Vim. Studies have shown that these signals translate into improved symptoms for patients with movement conditions – mainly Parkinson's disease, dystonia and essential tremor. DBS surgery does not cure the disease, but can help reduce the severity of symptoms, such as:

- **Tremors**
- **Rigidity**
- **Freezing**
- **Slow movements**
- **Facial expression**

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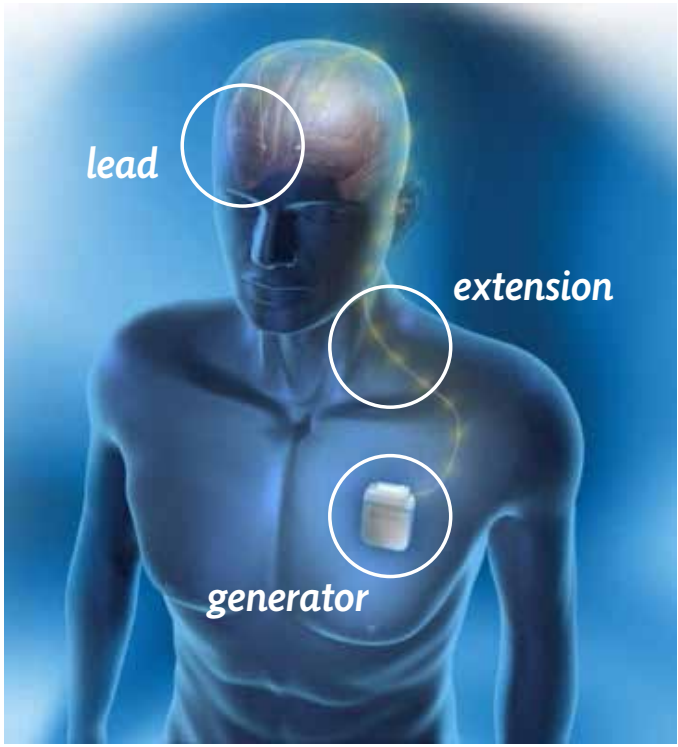
Components of DBS

Deep brain stimulation (DBS) consists of three components:

- An extremely thin, insulated wire known as a lead (electrode), which is inserted into the brain
- A pacemaker-like device known as a generator (neurostimulator), which is implanted near the collarbone
- A thin, insulated wire known as an extension, which connects the lead to the generator

The Denver DBS Center is pleased to offer patients the new two-step Asleep DBS that reduces the number of procedures and surgery time, allows patients to remain asleep during all surgeries, and improves electrode placement.

Guidelines for DBS differ for each condition, but generally patients must have moderate to severe symptoms of their disease, and they must respond well to drug therapies. Doctors commonly recommend that DBS be performed before the patient loses any abilities that may be critical to his/her quality of life. Use this guide to determine if DBS might be right for you.



Two Choices in DBS Procedures

The Denver DBS Center is only one of a few facilities in the world to offer both **Asleep Deep Brain Stimulation (DBS)** and **Awake DBS**. Both are safe and effective, yet each offers unique benefits, ranging from surgery time to electrode placement to actively observing the process. While choosing a DBS procedure that best suits your needs should be discussed your neurologist or primary care physician, this guide is a starting point to help you better understand both procedures. You'll find a description of both procedures and a questionnaire to help you rate your options.

TIP *Be sure to print this guide out and jot down notes throughout and at the end, along with questions, that you can use when talking with your doctor.*

WATCH this before and after video of a patient with Parkinson's disease before and after DBS.

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Asleep DBS

Asleep Deep Brain Stimulation (DBS) has turned the traditional three-step DBS process into two, while shortening surgery time and improving placement of the electrodes.

1. The initial surgery allows for lead planning and placement under general anesthesia (asleep) by utilizing a portable CT machine (CereTom®) to provide intraoperative images that can be overlaid on an earlier MRI.
2. The second surgery entails the implantation of the generator. Electrode placement during Asleep DBS takes roughly half the time as Awake DBS and placement is within one millimeter of the target as compared to 1-2 millimeters.

First introduced in 2011, Asleep DBS is now the procedure of choice for 60-70% of Denver DBS Center patients. A study published in the *Journal of Neurosurgery* found that DBS performed under general anesthesia (asleep) is as safe and effective as the procedure performed under local anesthesia (awake).[1]

The Denver DBS Center's David VanSickle, MD, PhD, has advanced an evidence-proven Asleep Deep Brain Stimulation (DBS) procedure and is one of only a few neurosurgeons worldwide to offer Asleep DBS.

1 Harries AM, Kausar J, Roberts SA, et al. Deep brain stimulation of the subthalamic nucleus for advanced Parkinson's disease using general anesthesia: long-term results. *Journal of Neurosurgery*. 2012;116(1);107-113.

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Awake DBS

Awake Deep Brain Stimulation (DBS) has been performed more than 100,000 times during the last 25 years. Awake DBS involves a pre-surgery MRI as well as three surgeries. Since the patient is awake during electrode placement, the electrodes can be tested and adjust during the procedure to ensure proper placement. Patients can also interact and respond during the first two procedures, allowing for active participation in the process.

1. The first surgery entails the placement of fiducial markers through an MRI or CT scan while the patient is awake.
2. The second surgery consists of the placement of the leads while the patient is awake and under local anesthesia.
3. The third surgery involves the implantation of the generator and extension while the patient is asleep under general anesthesia.

SEE how DBS changed this patient's life.

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How Awake and Asleep DBS Stack Up

	AWAKE DBS	ASLEEP DBS
Surgeries	Three surgeries, two of which are performed while the patient is awake.	Two surgeries, both of which are performed with the patient asleep.
MRI/CT	Takes place prior to surgery, requiring an additional procedure and visit.	Performed during the first surgery, eliminating a pre-surgery visit.
Electrode Placement Time	Electrode placement takes 4-6 hours.	Entire procedure takes 2-3 hours.
Electrode Placement Accuracy	Placement is within 1-2 millimeters of target.	Electrode placement is typically within one millimeter of target.
Electrode Testing	Electrode testing conducted during surgery to ensure proper placement.	Electrode testing not necessary.
Movement Errors	A small chance of movement errors is possible since the patient is awake during two of the three procedures.	No risk of movement errors since the patient is asleep.
Patient Awareness During Procedures	Patient is able to interact, respond, and follow along during the first two surgeries.	Patient is not able to interact, respond, or follow along during the surgeries.
History of Use	First used in 1987. Approved by the FDA in 1997 for essential tremor and 2002 for Parkinson's disease.	CereTom CT first used for DBS in 2011, making widespread Asleep DBS possible.

Which Procedure Is Right For You?

Determining whether Awake deep brain stimulation (DBS) or Asleep DBS is right for you or your loved one is a personal decision that should be based on your preferences. Use the following assessment to help determine whether Awake DBS or Asleep DBS might be the better option for you.

Rank the following on a scale **from 1-10** with **1 being "definitely true," 5 being "neutral,"** and **10 being "absolutely not true."**

	SCORE	NOTES
I do not mind MRIs.		
I am interested in knowing what is happening and to receive a "play-by-play" during the procedure.		
The number of years the procedure has been performed is a top priority for me.		
I want the doctor to be able to test the electrode placement during surgery.		
More precise electrode placement is not important to me.		
The number of surgeries or surgery time is not a concern of mine.		
Being awake during the surgery does not concern me.		

Now add up your score. If your score is between 7-35, Awake DBS might be the best option for you. If your score is higher than 35, Asleep DBS may be the best choice for you.

Share this questionnaire with your neurologist to discuss your options or contact the Denver DBS Center toll-free at 1.855.202.9303 for a free phone consultation.

About The Denver DBS Center

At the Denver DBS Center, we put you first, ensuring that your questions and needs are addressed every step of the way. Our team provides a patient concierge service, neurosurgeons, and a customized inpatient rehabilitation program. Drs. VanSickle and Szapiel, along with our expert DBS team, also partner with your neurologist to ensure customized and personalized care.

Why Choose the Denver DBS Center?

- One of only a few centers in the world to provide both Asleep and Awake Deep Brain Stimulation
- More than six years of experience performing hundreds of DBS surgeries
- Complication rate well below national average
- Attention to detail with electrode placement, the most vital aspect of the surgery.
- Customized care and attention, with a patient concierge service, coordinated pre- and post-surgery visits, and inpatient programming
- Partners with your neurologist

WATCH a video on DBS with Dr. VanSickle of the Denver DBS Center.

David VanSickle, MD, PhD

Dr. David VanSickle specializes in functional neurosurgery, neuro-oncology, deep brain stimulation, and surgery for epilepsy. He is one of only a few neurosurgeons worldwide to perform Asleep DBS

Mariel Szapiel, MD

Dr. Mariel Szapiel has concentrated her training and research in stereotactic and functional neurosurgery, including the use of deep brain stimulation.

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Notes

What questions do you have about Asleep Deep Brain Stimulation (DBS), Awake DBS, or both?

My biggest concerns are …

I need more information about …

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