Medtronic is the market leader in Deep Brain Stimulation (DBS) and distinguishes its portfolio through a philosophy of **"Sensing" technology**. Unlike traditional systems that only deliver stimulation *to* the brain, Medtronic's flagship devices can also *read* signals from the brain to guide therapy.

Here is a rundown of what Medtronic provides in the DBS space, categorised by devices, leads, and software.

1. The Core Ecosystem: "Percept" Family

The current generation of Medtronic neurostimulators is branded under the **Percept**™ name. The key differentiator for these devices is **BrainSense**™ **technology**, which captures brain signals (Local Field Potentials or LFPs) to help clinicians "see" the brain's activity and adjust treatment accordingly.

- **Percept™ PC (Primary Cell):**
  - **Type:** Non-rechargeable.
  - **Best for:** Patients who do not want the burden of regular charging.
  - **Tech:** It was the first device to offer BrainSense (sensing) capability.
- **Percept™ RC (Rechargeable):**
  - **Type:** Rechargeable.
  - **Best for:** Patients with high energy settings or those who prefer a smaller device footprint.
  - **Tech:** It is currently the **smallest and thinnest** rechargeable DBS device on the market.
  - **Battery:** rapid charging (from 10% to 90% in <1 hour) and a 15+ year lifespan.

> **Note on Legacy Devices:** You may still see the **Activa**™ series (Activa PC, RC, SC) in older literature or existing patients. These are Medtronic's previous generation devices. They are reliable but lack the "brain sensing" hardware found in Percept.

2. Lead Technology: "SenSight"

The leads are the wires implanted in the brain. Medtronic's latest offering is the **SenSight**™ **Directional Lead System**.

- **Directional Stimulation:** Unlike older leads that blast electricity in a 360-degree ring, SenSight leads have segmented contacts. This allows the clinician to "steer" the electrical current toward beneficial areas and *away* from areas that cause side effects (like speech or vision issues).
- **Built for Sensing:** These leads are specifically designed to work with the Percept device to record brain signals accurately.
- **"1-3-3-1" Configuration:** The electrodes are arranged with two bands of directional segments in the middle, offering precise targeting options.

3. The "Smart" Feature: Adaptive DBS (aDBS)

This is the most significant recent advancement (FDA approved circa Feb 2025).

- **What it is:** Traditionally, DBS delivers a constant stream of electricity (Continuous DBS). **Adaptive DBS** (aDBS) automatically adjusts the strength of stimulation in real-time based on the brain signals (beta bands) detected by the Percept device.
- **Benefit:** If a patient's medication kicks in and they need less stimulation, the device turns down. If their symptoms flare up, the device turns up. This mimics the body's natural demands more closely than a static setting.

4. Software & Visualisation

- **SureTune™ 4 Software:** This is a visualisation tool for clinicians. It takes the patient's MRI/CT scans and creates a 3D model of their specific anatomy. It allows the doctor to "see" exactly where the lead is inside the brain and simulate how different settings will affect the tissue, removing much of the guesswork from programming.
- **Patient Programmer:** A Samsung-based handheld device (looks like a smartphone) that allows patients to turn therapy on/off, check battery, and log events (e.g., "I took my meds," "I felt a tremor"). This data is time-stamped and correlated with the brain signals recorded by the device for the doctor to review.

5. Key Differentiators & Practicalities

- **MRI Compatibility:** Medtronic is the only manufacturer that claims full-body 1.5T and 3T MRI eligibility **with the stimulation left ON** (under specific conditions). Other systems typically require the device to be turned off (bipolar mode off) during scans, which can be difficult for patients who have severe tremors or rigidity when therapy stops.
- **Remote Care vs. Competitors:**
  - *Correction/Clarification:* You may hear about "NeuroSphere" (remote programming from home)—that is **Abbott's** system.
  - **Medtronic's Approach:** Medtronic focuses on **Data Logging**. The patient programmer logs symptoms and events, which the doctor downloads to see a history of brain activity. While they have digital tools, their "killer app" is the sensing data helping the doctor make decisions, rather than the pure "telehealth" video-programming focus of competitors like Abbott.

Summary of Approved Indications

Medtronic DBS is FDA-approved to treat:

1. **Parkinson's Disease** (Tremor, stiffness, slowness)
2. **Essential Tremor**
3. **Dystonia** (Approved under Humanitarian Device Exemption)
4. **Epilepsy** (Anterior Nucleus of the Thalamus target)

5. **Obsessive-Compulsive Disorder (OCD)** (Approved under Humanitarian Device Exemption)

Would you like me to...

- Compare the **battery life** specifications of the Percept RC against competitors like Boston Scientific or Abbott?
- Deep dive into the **clinical data** supporting Adaptive DBS (aDBS)?