

**remedē System
Frequently
Asked Questions**

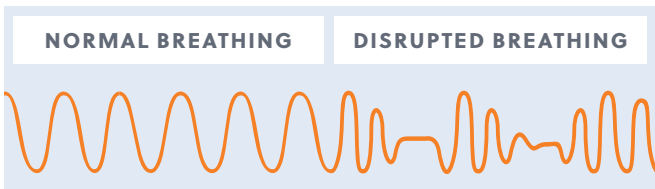
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Central Sleep Apnea

What is Central Sleep Apnea (CSA)?

Central sleep apnea is a sleep breathing disorder in which your brain does not send regular signals to your breathing muscle (diaphragm). These inconsistent signals from your brain lead to pauses in breathing or shallow breathing that are called apneas or hypopneas. These events may disrupt your sleep and cause your blood oxygen levels to drop (hypoxemia).¹



What is the Apnea Hypopnea Index (AHI)?

The apnea hypopnea index is a common metric used by sleep clinicians to measure how many apnea events occur per hour of sleep. The AHI includes all types of apnea and hypopnea events, including central apneas, obstructive apneas, mixed apneas, and hypopneas.

What is the difference between Central Sleep Apnea (CSA) and Obstructive Sleep Apnea (OSA)?

Obstructive sleep apnea (OSA) and central sleep apnea (CSA) are both types of sleep apnea.

In OSA, the breathing muscles (e.g. diaphragm) are activated appropriately but a narrowing of the passages in the upper airway (the tongue or throat) cause a blockage that prevents air from flowing freely. The obstruction can be due to bodily features or a relaxation of the muscles in the chest and neck during sleep.¹

In CSA, the brain fails to send regular signals to the diaphragm. The lack of consistent signals leads to irregular nighttime breathing.¹

Some people have both OSA and CSA and this is sometimes called complex sleep apnea. Determining how to address complex sleep apnea will take consideration and consultation with your physician regarding managing the complete picture of your sleep breathing disorders.

What causes central sleep apnea?

The American Association of Sleep Medicine categorizes adult CSA into five types based on the etiology, or cause of the disease:²

1. Central sleep apnea with Cheyne-Stokes breathing. Cheyne-Stokes is a specific pattern of breathing with a gradual increase and decrease in breathing followed by periods of absent or shallow breathing
2. Central sleep apnea due to a medical disorder without Cheyne-Stokes breathing
3. Central sleep apnea due to high altitude periodic breathing
4. Central sleep apnea due to a medication or substance use
5. Primary central sleep apnea (not caused by other issues listed above)

remedē[®] System

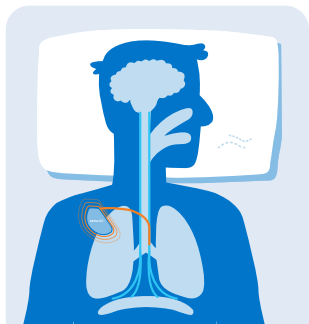
What is remedē?

remedē is a pacemaker-like device that stimulates your breathing muscles (via the phrenic nerve) to restore a normal breathing rate and rhythm during sleep. It is fully implantable and activates automatically each night.³

How does remedē work?

remedē activates automatically each night to send signals to your diaphragm from the phrenic nerve to restore a more normal breathing pattern. The signals cause your diaphragm to contract, drawing air into your lungs, just as in normal breathing.

remedē also monitors breathing signals while you sleep. Because the device is implanted and activates automatically, it does not require wearing a mask or other equipment at home.³



When will remedē activate at night?

The **remedē** System is programmed to automatically begin therapy each night when **all three** of the following programmable conditions are met:

- 1) **Sleeping hours:** It is within your normal sleeping times; (for example, 11:00 PM to 6:00 AM)



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- 2) **Sleeping posture:** You are in a sleeping posture (for example, a horizontal position)

You are reclined past your programmed sleeping angle



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- 3) **Activity:** Your activity level is representative of a sleeping or resting condition

AND you are still



Can I pause or turn remedē off?

If you roll over, sit up, or get out of bed, the therapy will pause and resume once the above three conditions are once again met.³

Therapy pauses if you roll over



OR when you sit up



What does remedē feel like?

In our experience, most people describe their first breaths with **remedē** as taking a breath that you didn't plan on. Once activated, **remedē** is designed to turn on once you are already asleep and operate without waking you up.⁴

We encourage you to hear how patients describe **remedē** by visiting the following website:

remede.zoll.com/patients/hear-from-others

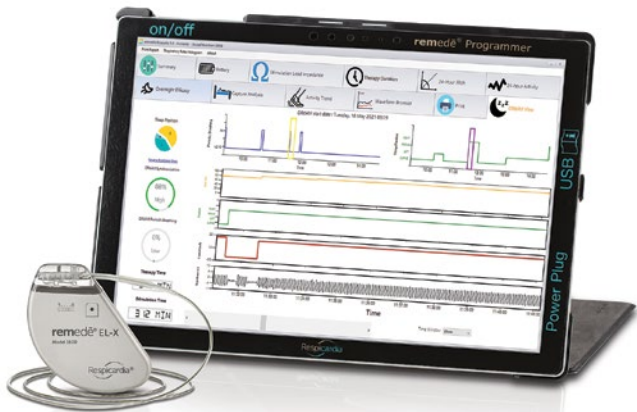
"After getting the device I found I could do things that I couldn't before because I had more energy."

Bob S., remedē System recipient, Odessa, MO

Eligibility for **remedē**

Who is a candidate for **remedē**?

remedē is FDA-approved for adults with moderate to severe central sleep apnea. **remedē** is contraindicated for people with an active infection.³



Eligibility for **remedē**

Is a person with both central and obstructive sleep apnea eligible for **remedē**?

remedē is FDA-approved for adults with moderate to severe central sleep apnea.³ Consult with your doctor to determine whether you are a candidate for **remedē**.

Is the **remedē** System approved for Magnetic Resonance Imaging (MRI)?

The **remedē** System has received MR conditional approval in the United States only. It is retro-compatible with previously implanted **remedē** devices. For more information, please visit the MRI Resources section on our website.

Can someone with **remedē** use additional therapies for OSA?

Prior to FDA approval, **remedē** was studied without additional forms of apnea therapy such as CPAP masks. The published clinical data, as well as the data on **remede.zoll.com**, reflects use of the **remedē** therapy alone.

However, following FDA approval, physicians have used other therapies such as CPAP in conjunction with **remedē** to further reduce apneic events caused by OSA. The FDA approval does not exclude the use of additional therapies.

Coverage and Cost

How much will I have to pay for remedē?

The hospital will work with your insurance plan to determine what, if any, of the cost is billed to you. Talk to your physician about insurance coverage, as many insurance companies work with clinicians to evaluate coverage for **remedē** based on your individual case.

Is this therapy covered by insurance?

remedē is generally being reviewed for approval by insurance providers on a case-by-case basis. After determining that you are a candidate for **remedē**, your doctor and their office staff will work with your insurance provider on securing coverage for the procedure.

What happens if the procedure is denied by my insurance company?

In most cases, you are able to appeal a denial by your insurance company and request further review of your case. Ask your physician about the **remedē** Patient Access Program, which provides resources for supporting insurance prior authorization appeals.

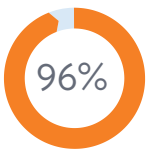
You can also speak to a reimbursement specialist at Respicardia by calling **952-540-4470** or email questions to **reimbursement@remede.zoll.com**

Efficacy and Safety

How effective is **remedē**?

The **remedē** System works to continuously and automatically monitor and stabilize the breathing pattern, restoring sleep throughout the night.

In a clinical research study evaluating patients after 12 months of therapy, **remedē** has been shown to significantly reduce the effects of CSA:



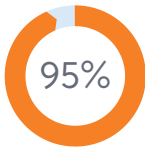
96% reduction in the median Central Apnea Index⁵



88% of patients had a reduction in the number of sleep apnea events per hour^{6,7}



78% of patients had an improvement in quality of life⁶



95% of patients would get **remedē** again⁶

What are the risks associated with the **remedē** procedure or therapy?

As with any surgically implanted device, there are risks related to the implant procedure which may include, but are not limited to, pain, swelling and infection. Once the **remedē** System is implanted and the therapy is activated, some people may experience discomfort from the therapy and/or from the presence of the device. The majority of these events are resolved on their own or by adjusting the therapy settings. The **remedē** System may not work for everyone. There are additional risks associated with removing your system. If you and your doctor decide to remove the system, another surgery will be required.³

Be sure to talk with your doctor so that you thoroughly understand all of the risks and benefits associated with the implantation of the **remedē** System.

How long does the battery last?

The latest models of the **remedē** System have batteries that typically last between 4-6 years. Some people may not need replacement for over 6 years. However, if higher levels of therapy are needed to normalize breathing, the battery may need to be replaced in 2 years or less.³

Where can I learn more about remedē?

Read more about **remedē**, access a schedule of upcoming webinars about **remedē**, ask a question, or speak with a **remedē** patient by visiting **remede.zoll.com** or by scanning the QR Code below.



Procedure

What happens during the procedure?

The **remedē** System is placed during a minimally invasive procedure by a cardiologist. The system is a battery powered device placed under the skin in the upper chest area with one small thin wire to deliver the therapy (stimulation lead).³

Is there anything I need to do to prepare before the procedure?

This will vary by patient and provider. Talk to your physician about what preparation is recommended.

How long will I stay in the hospital for the procedure?

The **remedē** System is placed during a minimally invasive outpatient procedure by a cardiologist. Some patients go home the same day, while others may stay overnight for observation.



Post-Procedure Care

Will I have any limitations following the procedure?

Follow all advice from your doctor after the procedure. Most people can resume normal activity 7-10 days after the procedure. For the first 1-3 months:⁹



It is typically recommended that you wear a sling to keep your arm in a low position for the first 48 hours.



Avoid raising your arm above your shoulder.



Minimize upper extremities activities and exercise.



Limit friction on the skin over the implanted area.

Avoid high powered electromagnetic fields, maintain distances when using a cell phone, avoid scuba diving or hyperbaric chambers, and limit physical activities prone to falling.

Will I feel therapy before my therapy activation visit?

Your **remedē** system will not be active yet. During this time, while you recover, the device collects data on your sleeping and breathing patterns. Therapy will begin following your activation appointment.

What follow up visits are required?

You typically return about one month after implant to activate therapy. Your device will be programmed based on settings tested during your activation visit. Therapy will start at a low level and automatically increase in strength over the next several weeks. This allows you to slowly acclimate to **remedē** therapy.



Now that your remedē system is active, what should you expect?

Typically, you will have follow-up visits that will help fine-tune your settings to achieve the best results. Expect 2-3 additional visits after your Therapy Activation that will be scheduled with your sleep provider and **remedē** team. Your sleep provider may elect for you to have a confirmatory sleep study to further fine-tune your **remedē** system. Once optimized, you can expect 1-2 follow-ups per year.

Helpful Tips When Acclimating to remedē Therapy

- Your **remedē** device is programmed to deliver therapy at a personalized breathing rate.
- Unlike some treatments, the device does not wait for an apnea to occur. Instead, it works proactively by regulating your breathing throughout the night to help prevent central events.

What You May Feel

You may notice sensations in your abdomen during therapy. This is normal and expected. It means the device is stimulating your diaphragm to help support your breathing while you sleep.

Feeling these sensations is a sign that the therapy is active and working as intended.

Tip if You Feel “Out of Sync”

If your breathing ever feels slightly out of sync with the therapy, briefly hold your breath, wait for the next pulse, and then resume breathing with the device’s rhythm by inhaling with the next stimulation.

Recipe for Success

While this may seem like a lot of information at first, most patients find that adjusting to **remedē** therapy is simple.

The best approach is to keep it easy — just focus on getting a good night's sleep. Your device works automatically throughout the night and does not require you to think about the therapy while you sleep.

Over time, many patients find the therapy becomes a natural part of their nightly routine.

Having an MRI or surgery?

Your **remedē** System may be eligible for MRI scanning. A pre-MRI visit is required with your following **remedē** center. A visit may also be required prior to surgery. Please contact your sleep provider for more information and to schedule an in-office visit.

Will TSA/metal detectors or airplane travel be a problem for me if I get the device?

You should talk to your doctor about any specific concerns. Electronic equipment such as that designed to prevent theft and airport metal detectors may affect the **remedē** System. Alert security personnel about the System and request a manual search if possible. If walking through a surveillance system, do not remain near this system longer than needed.⁸

Long-term benefits of the **remedē** System

Do people feel better after getting the **remedē** System?

78% of people implanted with the **remedē** System reported an improvement in their quality life at 6 months.⁶ Keep in mind that there are risks associated with any implantation procedure. The most common risks are similar to those of other implant procedures, including risk of infection.

What are the long-term results of the **remedē** System?

Long-term clinical trial results reporting follow-up out to 5 years have been published. The reported data shows consistent and sustained results of the **remedē** System in reducing AHI, central apneas, arousals, and oxygen desaturation events.⁵

Can I speak with someone who has had the device for many years?

Yes, many of the patients that were involved in the **remedē** pivotal trial have had their devices for 5+ years. Email **info@remede.zoll.com** and we can connect you with these patients so you can hear directly from them what **remedē** has meant to them.

References

- ¹ Javaheri S., Dempsey J.A. (2013) Central sleep apnea. *Compr Physiol.* 2013; 3:141–163.
- ² Sateia MJ. (2014) International classification of sleep disorders-third edition: highlights and modifications. *Chest.* 2014; 146(5):1387-1394.
- ³ FDA PMA P160039, Supplement 006, Physician Manual.
- ⁴ <https://www.remede.zoll.com/patients/hear-from-others/>.
- ⁵ Costanzo MR, Javaheri S, Ponikowski P, et al. Transvenous Phrenic Nerve Stimulation for Treatment of Central Sleep Apnea: Five-Year Safety and Efficacy Outcomes. *Nat Sci Sleep.* 2021;13:515-526.
- ⁶ Costanzo MR, Ponikowski P, Javaheri S, et al. Sustained Twelve Month Benefit of Phrenic Nerve Stimulation for Central Sleep Apnea. *Am J Cardiol.* 2018. pii: S0002-9149(18)30258-3. doi: 10.1016/j.amjcard.2018.02.022.
- ⁷ Costanzo M, et al. Transvenous neurostimulation for central sleep apnoea: a randomised controlled trial. *The Lancet.* 2016; 388: 974–82.
- ⁸ **remedē** System Patient Manual.

For questions

For further information, please visit remede.zoll.com, call **+1-952-540-4470** or email info@remede.zoll.com.

Important Safety Information

The **remedē**® System is indicated for moderate to severe Central Sleep Apnea in adult patients. Your doctor will need to evaluate your condition to determine if the **remedē** System is right for you. The **remedē** System is MR Conditional but conditions apply. Please make sure that your physician knows about the conditions and precautions to ensure safety, which can be found in the **remedē** System MRI guidelines manual. You should not have the **remedē** System implanted if you have an infection and you will not be able to have diathermy (special heat therapies) after implantation. The **remedē** System may be used if you have another stimulation device such as a heart pacemaker or defibrillator; special testing will be needed to ensure the devices are not interacting. As with any surgically implanted device, there are risks related to the surgical procedure itself which may include, but are not limited to, pain, swelling, and infection. Once the therapy is turned on, some patients may experience discomfort from stimulation and/or from the presence of the device. The majority of these events are resolved either on their own or by adjusting the therapy settings. The **remedē** System may not work for everyone. There are additional risks associated with removing your system. If you and your doctor decide to remove the system, another surgery will be required.

Be sure to talk with your doctor so that you thoroughly understand all of the risks and benefits associated with the implantation of the **remedē** System.

Rx only. For further information, please visit remede.zoll.com, call +1-952-540-4470 or email info@remede.zoll.com.

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