



California Pacific  
Medical Center

A Sutter Health Affiliate  
With You. For Life.

# Vagus Nerve Stimulator

## CALIFORNIA PACIFIC EPILEPSY PROGRAM

At California Pacific Medical Center neuroscience specialists bring new and advanced surgical options to the physicians we serve and the patients they care for. Working collaboratively, our neuroscience experts provide comprehensive patient care using leading-edge technology for treating the most complex neurological conditions. Through this procedure profile, our physicians illustrate surgical techniques for treating epilepsy that can not be controlled with anti-seizure medication alone.

Our promise to our patients is to deliver the highest quality expert care with kindness and compassion. We go beyond medicine to treat the whole person, not just the illness. Because medicine can transform a body, But going beyond medicine can transform a life.

For patient referrals:

1-888-637-2762

[www.cpmc.org/epilepsy](http://www.cpmc.org/epilepsy)

Beyond Medicine.

### *Vagus nerve stimulation*

Vagus nerve stimulation (VNS) was approved by the United States Food and Drug Administration (FDA) in 1997 for use as an adjunctive therapy in patients over 12 years of age in reducing the frequency of partial onset seizures that are refractory or resistant to antiepileptic drugs. VNS helps to prevent or interrupt electrical disturbances in the brain for persons with hard to control epileptic seizures. Used in conjunction with anti-seizure medications, VNS uses electrical pulses that are delivered to the vagus nerve in the neck and travel up into the brain. The vagus nerve has very few pain fibers, and therefore acts as an excellent pathway to deliver signals to the brain without the need for direct brain stimulation.

### *How does VNS work?*

Although it is not completely understood how VNS reduces seizure activity, studies suggest that persistent VNS therapy causes changes in brain chemistry that may reduce excitatory amino acids, and/or increase inhibitory levels, thus reducing seizure activity.

### *What does VNS surgery involve?*

The VNS system is implanted using two small incisions – one in the patient's neck for access to the vagus nerve, and one below the collarbone in the chest wall or armpit. The VNS pulse generator is placed under the skin of the chest in a surgically created pocket and the electrode is tunneled subcutaneously

from the neck incision. The electrodes are wrapped around the Vagus nerve.



*Incision points and wires wrapped around Vagus nerve*

The battery within the generator supplies energy for a number of years and eventually requires surgical replacement. When appropriate, we use the new smaller 103 DEMIPULSE™ single connector and DEMIPULSE DUO™ dual connector VNS devices, launched in 2008 by Cyberonics. Smaller than previous devices, the new VNS implant fits in the palm of your hand, (approximately ½ in thick, by 1 ¼ in long and 1 ¼ in wide) and the battery life expectancy is from three to eight years depending on the device setting. Each device is programmed for the individual patient, and the patient or a caregiver has the ability to initiate or abort stimulation with the use of a hand-held magnet.



*Demipulse 103 and Demipulse Duo VNS: Image courtesy and copyrighted material of Cyberonics.*

## How do patients benefit from VNS?

Approximately half of the patients who have received a VNS implant report up to a 50% reduction in seizure frequency, a 75% reduction in hospital admission days and substantial improvement in their quality of life.

## What are the side effects?

Complications are rare and mild to moderate when reported, but can include transient vocal cord paralysis, hoarseness, throat pain, shortness of breath, coughing and fluid accumulation or generator site infection.

## Case Study: Refractory Epilepsy, Status Epilepticus

### CASE OVERVIEW

As a toddler, this patient developed meningitis and subsequently experienced learning problems, as well as emotional and screaming episodes. He suffered his first tonic-clonic seizure at 17, which were somewhat controlled with medication, but continued to experience two or three seizures annually. When he was in his early 30's the seizure frequency increased and he developed postictal psychosis. During this time his seizures also became violent causing him personal injury. His seizures were poorly controlled, and at 57 he was referred to us for surgical evaluation. He was experiencing several falling spells and seizures each month. Although he had been evaluated at multiple facilities, the region of seizure onset was unclear.

During his evaluation at California Pacific strip electrodes were implanted for seizure monitoring and multiple seizures were recorded. Interictal EEG abnormalities occurred in both frontal and temporal regions.

## Treatment

VNS implant was recommended in an attempt to decrease seizures. The device was implanted without complications.

## Outcome

After VNS implantation he continues taking antiepileptic medications and continues to experience seizures. Although VNS did not eliminate his seizures, VNS has reduced their frequency and intensity allowing the patient to live a more normal life.

## Patient Referral and Transfer Center services

**888-637-2762**

California Pacific Medical Center's Regional Referral and Transfer Center facilitates patient referrals and transfers 24 hours a day. By calling 888-637-2762, you are connected directly to a registered nurse or emergency medical dispatcher. Our specially trained team of professionals collects essential patient information and contacts physicians, initiates and coordinates patient referrals, and facilitates the patient transfer process when necessary.

Many physicians refer their patients directly to the California Pacific Epilepsy Center. Direct referrals can be made by calling 415-600-7880.

## Indications for VNS implant

- Seizures uncontrolled with anti-seizure medications
- Not a candidate for resective epilepsy surgery
- Quality of life issues due to uncontrollable seizures

## Insurance coverage

Most insurance plans cover VNS implant surgery. In order to avoid unexpected medical expenses, it's always best for patients to contact their insurance company prior to treatment to confirm coverage for this service and obtain prior authorization.

## Local lodging

**CATHEDRAL HILL HOTEL**  
1101 VAN NESS AVENUE  
SAN FRANCISCO, CA 94109  
CALL 415-776-8200 /  
800-622-0855  
*to receive the CPMC patient  
discounted room rate.*

When patients require an overnight stay in San Francisco, the Cathedral Hill Hotel is the lodging of choice for California Pacific Medical Center. California Pacific patients and families receive discounted room rates, including free breakfast and parking. Courtesy shuttle service is offered between the Cathedral Hill Hotel and California Pacific's Pacific Campus, Monday through Friday.

## For more information

**CALIFORNIA PACIFIC  
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2100 Webster Street, Suite 115  
San Francisco, California 94115  
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