

# Medically Refractory Headache:

## *Treatment with Peripheral Neurostimulation (PNS)*

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While the majority of headaches are caused by tension and do not require medical intervention, roughly 20 percent of the population experience incapacitating headaches that resist medical treatment. Migraines, cluster headaches, and occipital neuralgia are among these.

In 1999, the International Neuromodulation Society's journal *Neuromodulation: Technology at the Neural Interface* published clinical observations describing use of neurostimulation to reduce the severe head pain of occipital neuralgia that generally occurs to the rear of the head, in areas supplied by the occipital nerves.<sup>1</sup> The authors noted that, similar to treating neuropathic pain with spinal cord stimulation, using peripheral neurostimulation (PNS) on the occipital nerves induced a pleasant tingling sensation. They report the effect relieved the lightning-like pain condition by at least half in the patients whose conditions were monitored from 18 months to 6 years.

Most medically refractory headache syndromes, including migraines, cause pain throughout the head. Thus, an understanding of the structures and physiology underlying this pain is of paramount importance for practitioners who are considering using PNS as a therapy for chronic headache that is not relieved by more conservative measures.

Recent clinical results have seemed to support the expectation of some clinicians that applying PNS to a combination of the occipital nerves and nerves that supply the face might result in a better outcome.<sup>4-6</sup> (A partial convergence of these two systems occurs at the trigeminocervical complex.)

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Peripheral nerve stimulation for medically refractory headache appears safe, effective, and well-tolerated

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Indeed, the response rate for patients with intractable head-wide pain who were treated with neurostimulation to the occipital and trigeminal nerve systems is reported to be better than 90%<sup>4-6</sup>.

This is an improvement from using only stimulation to the occipital nerves for head-wide pain syndromes, which is reported to bring about just a 40% response<sup>11</sup>. (On average, patients who only have pain in the rear of the head, a posterior occipital syndrome, show improvement averaging 88% from occipital nerve stimulation, with the range running from 71 – 100%.)

Appropriate candidates for PNS for medically refractory headache syndromes should have<sup>7</sup>:

- Pain within the occipital or trigeminal systems, or both
- Recent neuropsychological testing
- A positive response to the anesthetic phase of respective nerve blocks

The procedure consists of a trial with temporary electrical leads. If this is successful, it is followed by permanent implantation of electrodes that are connected to a compact pulse generator. Following the implantation procedure, the patient visits the office to program the device in order to induce the optimum degree of stimulation to relieve symptoms. Prior to the trial, the patient may undergo testing to determine the exact placement of the leads – done through careful examination, often combined with diagnostic imaging involving use of a contrast agent or ultrasound<sup>8-10</sup>.

Complications are usually minor. These include medical complications, such as infection, bleeding or fluid collection under the skin, and hardware-related complications, including movement of the electrical lead, breakage, or pulse generator failure.

Much like results of spinal cord stimulation for neuropathy, medically refractory headache pain seems to respond to PNS well only when the tingling sensation evoked, paresthesia, occurs in all the primary nerve distributions involved (occipital and/or trigeminal).

There is a growing body of literature on these techniques, although continued studies – using random sampling of subjects at multiple treatment centers – are warranted to definitively assess their long-term effectiveness.

In summary, clinical evidence shows PNS procedures for medically refractory head pain syndromes are effective, safe, and well-tolerated.

### References

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**Please note:** This information should not be used as a substitute for medical treatment and advice. Always consult a medical professional about any health-related questions or concerns.

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### More information

American Council for  
Headache Education  
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American Academy of  
Neurology  
1080 Montreal Avenue  
St. Paul, MN 55116  
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American Headache Society  
19 Mantua Road  
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