

## **Electrical stimulation will replace medications for the treatment of cluster headache**

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Neurostimulation is a rapidly growing field in the headache disorders and provides an alternative therapeutic option particularly for intractable and chronic primary headaches such as chronic migraine, chronic cluster headache, SUNCT, or hemicrania continua. By employing invasive or non-invasive methods, central or peripheral neural structures can be targeted for stimulation in headache syndromes. Among others stimulation of greater occipital nerve (ONS) and stimulation of sphenopalatine ganglion (SPGS) are prominent for the management of intractable cluster headache patients. The exact mechanism of action for both procedures are still unclear. Review of the patients and follow-up data reveals following serious limitations: 1) ONS and SPGS are invasive techniques with device-related serious complications such as infection, pain, sensorial loss, paresis; 2) they are expensive and not cost effective, 3) battery and cable problems needs further surgeries, 4) Bilateral implantation is needed for ONS as a potential side shift (40%) occurs with unilateral implantation 5) pain and autonomic features are dissociated with ONS, 6) pain recurs upon cessation of stimulation 7) stimulation frequency yields opposite effects 8) lack of randomized studies with the use of a proper sham stimulation 9) Patients having neurostimulation still need concomitant use of prophylactic medications in long-term. Therefore, electrical stimulation of neither ONS nor SPGS will never replace medications for cluster headache.