Cleveland Clinic Innovations

Thorastim™ System

Usman Ahmad, MD, Sudish Murthy, PhD

PRODUCT
Opioid-free pain management after cardiothoracic surgery

INDICATION
Post-sternotomy pain, post-operative pain, neuro-stimulation, nerve-block, pain management

VALUE PROPOSITION
- Better pain control
- Reduced side effects of systemic medications
- Better quality of life

DEVELOPMENT STAGE
- Human Study Completed
  - Cadaver study
  - Anatomical study
  - Lead placement study
  - Early feasibility IDE

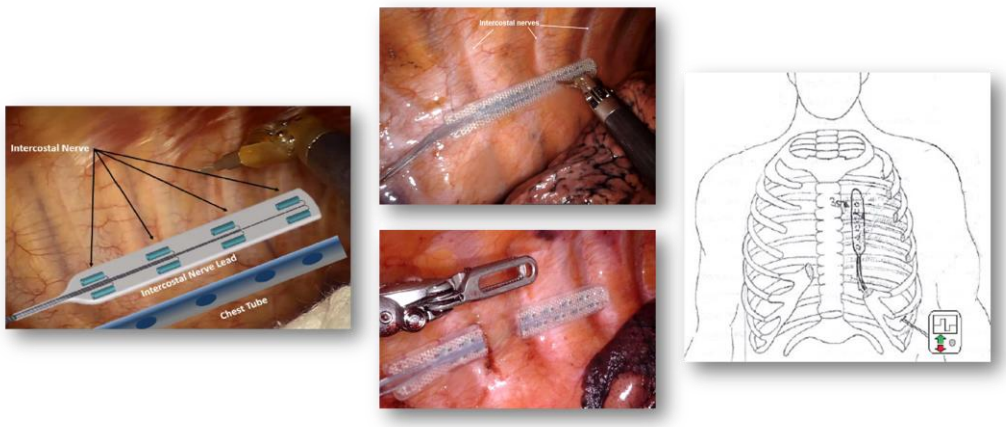
INTELLECTUAL PROPERTY
US Patent: 10,471,257
AU Patent: 2017268185

CONTACT INFORMATION
Partha Paul, PhD, MBA
Director, Business Development & Licensing
Email: paulp2@ccf.org
Phone: 216-672-1664

IDF:2016-004
IDF:2021-002

OPPORTUNITY
Pain is a major factor in limiting access to the pleural cavity. Postoperative pain is significantly associated with poor respiratory effort, mobility, and a higher risk of ensuing complications (pneumonia, atelectasis, deep vein thrombosis). Incidence of chronic post-sternotomy pain is high, from 21 to 56%. Etiology of post-surgical pain includes intercostal nerve compression, parietal pleural damage, and incision pain. Standards of care include IV/oral analgesics, IV/oral opioids, nerve block injections, epidural catheters, cryoablation and Enhanced Recovery After Surgery (ERAS) protocols. Nonetheless, surgeons are interested in finding a solution that works consistently for patients, significantly reduces the need for medications and addresses pain, both post-surgery and after discharge.

SOLUTION
The Thorastim™ device consists of small flexible electrodes that are implanted adjacent to peripheral nerves during surgery. By activating these nerves, the electromagnetic field can be utilized to block nerve conduction and achieve pain control after surgery. During thoracic surgery, the intercostal nerves are clearly visualized beneath each rib. At the end of the surgery, a series of electrodes can be applied and loosely fixed over each intercostal bundle. If a second electrode is required, a series of electrodes can be placed on the outside surface of the chest wall to apply an electromagnetic field from both sides of the nerve. The two-electrode series is connected to a generator which can provide a blocking current, providing a nerve block and hence controlling pain. When the patient no longer requires the electrodes, the implanted series of electrodes can be removed just like a chest tube.



Neurostimulation system for post-operative pain management