

## **ElutoCAT Drug-Eluting Thoracic Catheter**

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### Abstract

Thoracic surgery is an operative process that focuses on chest organs such as the heart, lungs, esophagus and the trachea. The surgery results in significant postoperative and chronic pain which is mainly caused by the insertion and continuous placement of a thoracic catheter in the patient's pleural space for up to 2 weeks. The insertion of the thoracic catheter, or better known as the chest tube, is imperative to drain air, fluid and blood post-operation. Current pain management strategies such as local analgesic injections, thoracic epidural or intravenous painkillers, fail to deliver localized, sustained pain relief to patients for the entirety of the time period in which they have a chest tube placement. Thus, we aimed to provide long-term patient pain relief by designing a silicon, drug-eluting thoracic catheter which would slowly elute lidocaine at the site of chest tube insertion, over a one week period. To demonstrate proof of concept, small slabs of silicon catheter were experimented on. The optimal dissolvable polymer, solvent and polymer to lidocaine ratios were determined via the dip-coating method. By performing UV spectroscopy and scanning electron microscopy, we demonstrated that we effectively coated a portion of a silicon chest tube in a polymer-lidocaine mixture and successfully eluted lidocaine from the coated tube into phosphate buffer saline over an hour. Future work will focus on increasing the amount of lidocaine loaded in order to reach physiologically relevant levels as well as key manufacturing processes that will enable product scale-up.