



## Second Laureate Innovation



**Project Title:** Designing an endotracheal tube for injecting air and drug to overcome emergence reactions during extubation

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### Abstract:

The technique entitled, "Intubation", is used to promote mechanical ventilation in surgical or intensive care settings, which is of vital importance during surgeries. During the intubation, the ETT and the distal cuffs act as foreign objects in the respiratory passages, leading to the intolerance of the patients and consequently to reactions in the air passages.

Extubation, or in other terms removal of the ETT(s) at the end of the anesthesia also leads to reactions that are technically called "Emergence reactions" including hypertension, tachycardia, dysrhythmia, increases in IOP (Intra Ocular Pressure), ICP (Intra Cranial Pressure), bucking or straining, bronchospasm, laryngospasm, glottic spasm and so on that can lead to myocardial ischemia, defective arterial oxygenation, and vomiting, which may in turn lead to serious repercussions endangering the life of the patient.

The intolerance of the ETTs can also lead to self-extubation of these devices by the patients that may lead to a critical situation, which if not attended promptly and urgently, can lead to the catastrophic outcomes.

Many methods have been used to overcome or at least lessen these reactions in patients, which include administration of opioids, sedatives, hypnotics, local anesthetics,  $\beta$  blockers, Na nitroprusside, topically applied local anesthetics, intra-cuff administration of lidocaine, intra-cuff administration of warmed and alkalized lidocaine, and new designs of ETT(s) such as Mallinckrodt ETT for applying local anesthetics to tracheal mucosa, using 10% lidocaine and etidocaine sprays through some channels on the ETT and the LITA ETT.

None of these methods have however been definitely and completely successful and safe in overcoming the problems mentioned above.

Thus the main objective of the present invention is to design a new cuff system to overcome the problems of the traditional cuffed ETTs mentioned above. The new cuff system is applicable to most cuffed medical devices.