Polyethylene Glycol Coating of Endotracheal Tubes for Local Therapy
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Purpose: To assess the suitability of a polyethylene glycol coating onto an endotracheal tube containing a model compound for local therapy.

Methods: Polyethylene glycol (PEG 1000) was used as the coating polymer due to its amphiphilic nature allowing for compatibility with the hydrophobic surface of the tube material, as well as rapid dissolution in an aqueous environment. PEG 1000 was heated to approximately 75 °C to its liquefied state with 1 – 2mL ethanol. As a model compound, 5% w/w caffeine was added with respect to PEG 1000 and allowed to mix thoroughly. Spray coating was performed in a fume hood using a Master Airbrush® System model G22 airbrush apparatus and a compressor (TCP Global, Lakeside, CA) while simultaneously rotating an endotracheal tube. (Figure 1). Masking tape was used to allow for uncoated regions of tube as necessary, and the initial and final weight of the tube was measured and recorded to determine the extent coating/loading. Triethyl citrate (TEC) 20% w/w with respect to PEG 1000 was added to the formulation to increase plasticity, ensuring suitability for coating of the inflatable bulb portion of the endotracheal tube. Dissolution was performed using a Vanderkamp 600 dissolution apparatus based on caffeine's absorption at 273 nm at 30 second intervals up to 150s at 100 rpm in 900 mL dissolution apparatus. To test for quality of the bulbs, 15 mL of air from 5 mL syringe was used inflate and deflate the bulb at least 5 times to observe for cracks before dissolution was performed.

Results: Both the elongated and bulb portions demonstrate similar rapid dissolution profiles (Figure 2). This is useful for the particular application of local therapy as a rapid onset would be preferred before removal of the endotracheal tube in a patient setting. Furthermore, no cracking of the coating was seen with a 20% w/w TEC composition.

Conclusion: Spray coating of PEG 1000 onto endotracheal tubes is a viable means to apply a drug containing film intended for rapid local release. Fast dissolution of API can occur with 90% model drug release in 60 seconds. Inclusion of a plasticizer can help prevent cracking of polymeric coating of the inflatable bulb for at least 5 cycles of inflation/deflation.

References