

PLA-PEG Albuterol Microparticles

Asthma, a chronic condition resulting in difficulty breathing, affects approximately 22 million Americans (National Institute of Health). Asthma has no cure, but can be managed for most mild to moderate patients with inhaled glucocorticoids (GCs) and bronchodilators. Although these drugs remain a cornerstone in the management of asthma, patients with severe disease experience profound airflow limitation and inflammation despite the use of bronchodilators and high doses of GCs.

Compelling data suggest that vitamin D3 differentially modulates airway inflammation from that of GCs and may provide therapeutic advantages in the treatment of severe asthma. The challenge, then, is to combine these treatments (namely albuterol and vitamin D3) into a singular delivery vehicle for targeted lung delivery. The microparticle shown in the SEM image was designed to do just that. The albuterol will be attached to the outside of the PLA-PEG microparticle as the ligand use to target receptors on the inflamed lung cells. The albuterol works then as the targeting mechanism as well as part of the delivery, since activation of the cell receptor should allow internalization of the microparticle. The microparticle will degrade over time allowing the controlled release of the encapsulated vitamin D3.

It is proposed that the microparticles, if aerosolized within a regular nebulizer or metered-dose-inhaler, could provide a targeted treatment for severe asthmatics in a patient-friendly device.

Figure

