Poly(lactic-co-glycolic acid) devices: Production and applications for sustained protein delivery
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Abstract

Injectable or implantable poly(lactic-co-glycolic acid) (PLGA) devices for the sustained delivery of proteins have been widely studied and utilized to overcome the necessity of repeated administrations for therapeutic proteins due to poor pharmacokinetic profiles of macromolecular therapies. These devices can come in the form of microparticles, implants, or patches depending on the disease state and route of administration. Furthermore, the release rate can be tuned from weeks to months by controlling the polymer composition, geometry of the device, or introducing additives during device fabrication. Slow-release devices have become a very powerful tool for modern medicine. Production of these devices has initially focused on emulsion-based methods, relying on phase separation to encapsulate proteins within polymeric microparticles. Process parameters and the effect of additives have been thoroughly researched to ensure protein stability during device manufacturing and to control the release profile. Continuous fluidic production methods have also been utilized to create protein-laden PLGA devices through spray drying and electrospray production. Thermal processing of PLGA with solid proteins is an emerging production method that allows for continuous, high-throughput manufacturing of PLGA/protein devices. Overall, polymeric materials for protein delivery remain an emerging field of research for the creation of single administration treatments for a wide variety of disease. This review describes, in detail, methods to make PLGA devices, comparing traditional emulsion-based methods to emerging methods to fabricate protein-laden devices. This article is categorized under: Biology-Inspired Nanomaterials > Protein and Virus-Based Structures Implantable Materials and Surgical Technologies > Nanomaterials and Implants Biology-Inspired Nanomaterials > Peptide-Based Structures.