2023 Celebration of Undergraduate Research

Nitric oxide-releasing polyacrylic acid/polyvinyl alcohol nanofibers

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Nanofibers are an emerging platform for many therapeutic applications within the fields of intracellular delivery, tissue engineering, and wound healing due to their morphological size and similarity to the extracellular matrix (ECM). Electrospinning, a technique in which voltage is applied to a polymer solution to create nanofibers, produces a non-woven mat of fibers with the ability to promote cell migration and adhesion. Nitric oxide (NO), an endogenously produced signaling molecule, plays roles in multiple physiological functions, including pathogen killing. To harness the benefits of nanofibers in conjunction with the antibacterial action of exogenously delivered nitric oxide, we developed poly(acrylic acid) (PAA)/poly(vinal alcohol) (PVA) electrospun nanofibers, post-modified with secondary amine-containing alkylamines and hyaluronic acid (HA). Nitric oxide was loaded onto the secondary amines in the form of a *N*-diazeniumdiolate NO donor. The order of reaction was systematically evaluated to attain necessary NO payloads for potential therapeutic applications. It was determined that modification of the amine with the fiber mats prior to HA modification yielded the best NO payloads. This work provides the foundation for future experiments to determine antibacterial efficacy and cytotoxicity of NO-releasing, HA-modified electrospun nanofibers.