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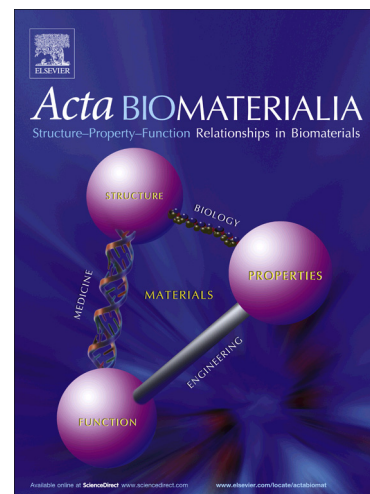
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Cell-matrix mechanical interaction in electrospun polymeric scaffolds for tissue engineering: implications for scaffold design and performance

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Abstract

Engineered scaffolds produced by electrospinning of biodegradable polymers offer a 3D, nanofibrous environment with controllable structural, chemical, and mechanical properties that mimic the extracellular matrix of native tissues and have shown promise for a number of tissue engineering applications. The microscale mechanical interactions between cells and electrospun matrices drive cell behaviors including migration and differentiation that are critical to promote tissue regeneration. Recent developments in understanding these mechanical interactions in electrospun environments are reviewed, with emphasis on how fiber geometry and polymer structure impact on the local mechanical properties of scaffolds, how altering the micromechanics cues cell behaviors, and how, in turn, cellular and extrinsic forces exerted on the matrix mechanically remodel an electrospun scaffold throughout tissue development. Techniques used to measure and visualize these mechanical interactions are described. We provide a critical outlook on technological gaps that must be overcome to advance the ability to design, assess, and manipulate the

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