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# Amphiphilic Degradable Polymers for Immobilization and Sustained Delivery of Sphingosine 1-Phosphate

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## **Amphiphilic degradable polymers for immobilization and sustained delivery of sphingosine 1-phosphate**

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Controlled delivery of angiogenic factor sphingosine 1-phosphate (S1P) represents a promising strategy for promoting vascularization during tissue repair and regeneration. In this study, we developed an amphiphilic biodegradable polymer platform for the stable encapsulation and sustained release of S1P. Mimicking the interaction between amphiphilic S1P and its binding proteins, a series of polymers with hydrophilic poly(ethylene glycol) core and lipophilic flanking segments of polylactide and/or poly(alkylated lactide) with different alkyl chain lengths were synthesized. These polymers were electrospun into fibrous meshes, and loaded with S1P in generally high loading efficiencies (>90%). Sustained S1P release from these scaffolds could be tuned by adjusting the alkyl chain length, blockiness and lipophilic block length, achieving 35-55% and 45-80% accumulative releases in the first 8 h and by 7 days, respectively. Furthermore, using endothelial cell tube formation assay and chicken chorioallantoic membrane (CAM) assay, we showed that the different S1P loading doses and release kinetics translated into distinct pro-angiogenic outcomes. These results suggest that these amphiphilic polymers are effective delivery vehicles for S1P and may be explored as tissue engineering scaffolds where the delivery of lipophilic or amphiphilic bioactive factors are desired.