Comparison between self-assembling peptide nanofiber scaffold (SAPNS) and fibrin sealant in neurosurgical hemostasis.

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Abstract:

RADA16-I is a synthetic type I self-assembling peptide nanofiber scaffold (SAPNS) which may serve as a novel biocompatible hemostatic agent. Its application in neurosurgical hemostasis, however, has not been explored. Although RADA16-I is nontoxic and nonimmunogenic, its intrinsic acidity may potentially provoke inflammation in the surgically injured brain. We conducted an animal study to compare RADA16-I with fibrin sealant, a commonly used agent, with the hypothesis that the former would be a comparable alternative. Using a standardized surgical brain injury model, 30 Sprague-Dawley rats were randomized into three treatment groups: RADA16-I, fibrin sealant or gelatin sponge (control). Animals were sacrificed on day 3 and 42. Astrocytic and microglial infiltrations within the cerebral parenchyma adjacent to the operative site were significantly lower in the RADA16-I and fibrin sealant groups than control. RADA16-I did not cause more cellular inflammatory response despite its acidity when compared with fibrin sealant. Immunohistochemical studies showed infiltration by astrocytes and microglia into the fibrin sealant and RADA16-I grafts, suggesting their potential uses as tissue scaffolds. RADA16-I is a promising candidate for further translational and clinical studies that focus on its applications as a safe and effective hemostat, proregenerative nanofiber scaffold as well as drug and cell carrier.

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