

Wireless charging-mediated angiogenesis and nerve repair by adaptable microporous hydrogels

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Traumatic brain injury causes inflammation and glial scarring that impede brain tissue repair, so stimulating angiogenesis and recovery of brain function remain challenging. Here we present an adaptable conductive microporous hydrogel consisting of gold nanoyarn balls-coated injectable building blocks possessing interconnected pores to improve angiogenesis and recovery of brain function in traumatic brain injury. We show that following minimally invasive implantation, the adaptable hydrogel is able to fill defects with complex shapes and regulate the traumatic brain injury environment in a mouse model. We find that placement of this injectable hydrogel at peri-trauma regions enhances mature brain-derived neurotrophic factor by 180% and improves angiogenesis by 250% in vivo within 2 weeks after electromagnetized stimulation, and that these effects facilitate neuron survival and motor function recovery by 50%. We use blood oxygenation level-dependent functional neuroimaging to reveal the successful restoration of functional brain connectivity in the corticostriatal and corticolimbic circuits.¹

1) R. S. Hsu, S. J. Li, J. H. Fang, I. C. Lee, L. A. Chu, Y. C. Lo, Y. J. Lu, Y. Y. Chen, S. H. Hu, Nat. Comm. **2022**, 13, 5172.