Dong Hee Kim, J Pharm Drug Deliv Res 2016, 5:3(Suppl)
http://dx.doi.org/10.4172/2325-9604.C1.008

9th World Drug Delivery Summit

June 30-July 02, 2016 New Orleans, USA

Enhancing neurogenesis and angiogenesis with targeted delivery of stromal cell-derived factor-1α by using a pH-sensitive polymer in a rat stroke model

Dong Hee Kim
Sungkyunkwan University, South Korea

We hypothesized that delivery of molecules which regulate the microenvironment after cerebral infarction can influence regeneration potential after stroke. Stromal cell-derived factor-1α (SDF-1α) is a chemoattractant molecule that increases in the infarct region after stroke and induces neurogenesis, angiogenesis, neuroprotection, and stem cell homing. Thus, we evaluated the effects of targeted delivery of SDF-1α by using a pH-sensitive polymer, a synthetic macromolecule with potential for targeted drug delivery in acidic conditions, to enhance therapeutic neurogenesis and angiogenesis in a rat model of permanent middle cerebral artery occlusion. First, the neurogenic and angiogenic potential of SDF-1α was measured in in vitro and in vivo. We observed that SDF-1α intracerebrally infused into the striatum increased BrdU/doublecortin-positive cells in the subventricular zone and vWF-positive microvessels and apoptotic cells in the ischemic border zone 7 days after cerebral ischemia. We then investigated the effect of a SDF-1α-Cy5.5-loaded pH-sensitive polymer systemically administered 3 hours after onset. ELISA showed increased tissue levels of SDF-1α in the ischemic region, indicating that the pH-sensitive polymer effectively delivered SDF-1α into the ischemic region. In addition, optical imaging showed that Cy5.5 signal increased in the infarct region 24 hours after administration. Immunohistochemistry data showed that delivered SDF-1α enhanced neurogenesis and angiogenesis, but did not influence cell survival or inflammation. The results of the present study show a novel approach to control the microenvironment by using targeted delivery of a polymer. SDF-1α-loaded pH-sensitive polymers can be used as pH-triggered targeting agents and effectively modify the microenvironment to increase innate neurorestorative processes.

Biography

Dong Hee Kim is a PhD student at Samsung Advanced Institute for Health Sciences and Technology, Sungkyunkwan University. He is a Senior Researcher at Samsung Medical Center.

ekafly@gmail.com

Notes: