P 16

In Situ Gelling and Mucoadhesive Polymer Vehicles as Controlled Nasal Delivery for Plasmid DNA

Jeong-Sook Park[1,°], Yu-Kyoung Oh[2], and Chong-Kook Kim[1]

[1] College of Pharmacy, Seoul National University, Seoul, Korea
[2] College of Medicine, Pochon CHA University, Kyounggi-do, Korea

Nasal administration of plasmid DNA is emerging as a new route of delivery for therapeutic genes and DNA vaccines. To improve the intranasal absorption of plasmid DNA, we designed delivery systems composed of in situ gelling and mucoadhesive polymers. Poloxamers (Pol) were used to provide in situ gelling property. Polycarbophil (PC) or polyethylene oxide (PEO) was used as mucoadhesive polymers. The gelation temperatures of the formulations slightly decreased by the mucoadhesive polymers, but not by plasmid DNA varied with the contents and type of mucoadhesive polymers. Of vehicles, Pol/PC 0.2% showed the highest absorption with an area under the curve value 11-fold higher than saline, the conventional vehicle. The nasal retention of plasmid DNA was highly prolonged by mucoadhesive polymers. At 3 h postdose, the nasal tissue levels of plasmid DNA given in Pol/PC and Pol/PEO 0.8% were 10- and 40-fold higher relative to saline. The histopathology of nasal tissues was not altered after repeated dosing over 2 weeks. The mRNA expression of plasmid DNA delivered by Pol or Pol/PEO 0.4% was observed in the nasal tissues. These results indicate that the nasal absorption of plasmid DNA can be effectively and safely enhanced by using in situ gelling and mucoadhesive polymer-based vehicles.