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Microspheres Modified with the Heparin Increasing the Length of Molecular Linker to Better Capture the Endotoxin

Qi Dang[1], Chun-Gong Li[1], Xin-Xin Jin[1], Ya-Jin Zhao[1] and Xiang Wang[1,*]

[1]Key Laboratory of Biorheological Science and Technology, Ministry of Education, College of Bioengineering, Chongqing University, Chongqing 400030, PR China.

*Corresponding author: Xiang Wang. E-mail: xwangchn@vip.sina.com.

Abstract: Endotoxin is a a very powerful and toxic inflammatory stimulator usually leading to the sepsis occurred. In order to remove endotoxin better through hemoperfusion, it is a pretty choice to increase the length of molecular linker on adsorbents. In this study, we chose the heparin as a molecular linker because of its being anticoagulant linear polysaccharide. Heparin as a linker was covalently immobilized on the chloromethylated polystyrene microspheres (Ps) and then connected with L-phenylalanine (Phe) forming the Ps-Hep-Phe structure to adsorbed endotoxin better. The property of microspheres was characterized by Fourier transform infrared spectroscopy, X-ray photoelectron spectroscopy, zeta potential and water contact angle. The hydrophilicity was improved after immobilization. The adsorption capacity of Ps-Hep-Phe for endotoxin adsorption was higher than that of Ps-Phe (No heparin). And the adsorbents with the heparin as a linker simultaneously showed the prolonged clotting times, low protein adsorption, and reduced the hemolysis rate, indicating that heparin as a molecular linker could play an important role in anticoagulation. Therefore, this study implied that heparin would be a promising strategy for adsorbents modification in hemoperfusion.

Keywords: Heparin; linker; anticoagulation; L-phenylalanine; endotoxin

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