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1: J Drug Target. 2005 Sep;13(8):449-58. Related Articles, Links

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# Differences in the adsorption behaviour of poly(ethylene oxide) copolymers onto model polystyrene nanoparticles assessed by isothermal titration microcalorimetry correspond to the biological differences.

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The adsorption behaviour of a tetrafunctional copolymer of poly (ethylene oxide)-poly (propylene oxide) ethylene diamine (commercially available as Poloxamine 908) and a diblock copolymer of poly (lactic acid)-poly (ethylene oxide) (PLA/PEG 2:5) onto a model colloidal drug carrier (156 nm sized polystyrene latex) is described. The adsorption isotherm, hydrodynamic thickness of the adsorbed layers and enthalpy of the adsorption were assessed. The close similarity in the conformation of the poly (ethylene oxide) (PEO) chains (molecular weight 5000 Da) in the adsorbed layers of these two copolymers was demonstrated by combining the adsorption data with the adsorbed layer thickness data. In contrast, the results from isothermal titration microcalorimetry indicated a distinct difference in the interaction of the copolymers with the polystyrene colloid surface. Poloxamine 908 adsorption to polystyrene nanoparticles is dominated by an endothermic heat effect, whereas, PLA/PEG 2:5 adsorption is entirely an exothermic process. This difference in adsorption behaviour could provide an explanation for differences in the biodistribution of Poloxamine 908 and PLA/PEG 2:5 coated polystyrene nanoparticles observed in previous studies. A comparison with the interaction enthalpy for several other PEO-containing copolymers onto the same polystyrene colloid was made. The results demonstrate the importance of the nature of the anchoring moiety on the interaction of the adsorbing copolymer with the colloid surface. An endothermic contribution is found when an adsorbing molecule contains a poly (propylene oxide) (PPO) moiety (e.g. Poloxamine 908), whilst the adsorption is exothermic (i.e. enthalpy driven) for PEO copolymers with polylactide (PLA/PEG 2:5) or alkyl moieties.