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Nanocarriers based on interpolyelectrolyte complexation of Sulphated polysaccharide-b-PEG diblock copolymers and PLL

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Glycosaminoglycans (GAGs) are integral part of the closest cellular environment: they can be found on the cells surface and in the extracellular matrix, where they interact with different proteins acting as local regulator of their activity. The use of GAGs in the preparation of protein delivery nanosystems is, therefore, prominent but so far, underexploited mainly because of the heterogeneity (composition and molecular weights) of natural glycans and the multistep procedures needed to obtain GAGs' synthetic analogues and diblock copolymers.1 Recently, we have shown that oxime click reaction can be applied as a straightforward methodology for the synthesis of poly(ethylene glycol) (PEG)-hyaluronic acid (HA) diblock copolymers.2 These copolymers formed nanosized interpolyelectrolyte complexes (45 to 150 nm) by interaction with poly- L -lysine (PLL).3 Unfortunately, these complexes are not stable at physiological ionic strength. Herein, we describe a strategy to overcome this drawback; chondroitin sulphate-b-PEG diblock copolymers (CS-b-PEG) were obtained using the same oxime click reaction. The stronger negative charge of sulphate groups (versus the carboxilic groups present in HA) resulted in the complexes with higher stability: interpolyelectrolyte complexes between PLL and (CS-b-PEG) are stable up to 260 mM ionic strenght. Because carbohydrates do not activate T-cells, we believe that the reported herein complexes have an enormous potential in both drug delivery and vaccination fields.4

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DOI: 10.1002/term.1822