Biocompatibility Evaluation of Biomedical Surfaces Modified with a Novel Zwitterionic Polymer

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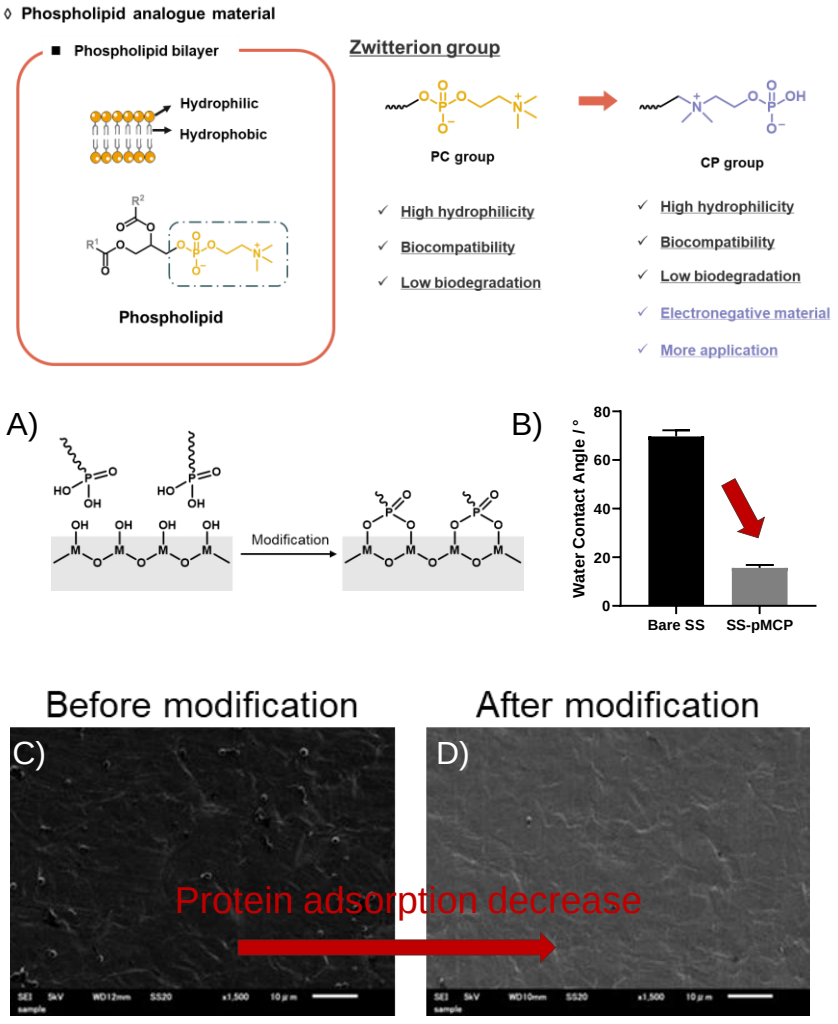

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On the surfaces of medical implants and devices, the adsorption of plasma proteins and the adhesion of platelets are well known to trigger thrombus formation and inflammatory responses. To mitigate these secondary reactions, the development of polymeric coatings with both high hydrophilicity and resistance to nonspecific adsorption is essential. Zwitterionic polymers, which possess structures analogous to cell membrane phospholipids, have been reported to effectively enhance biocompatibility.In this study, a novel monomer, MCHP (2-(methacryloyloxy)ethyl choline hydrogen phosphate), was designed and synthesized. This compound exhibits a phospholipid-like molecular structure, enabling stable immobilization onto diverse substrates including metals and polymers through its terminal phosphate group. Surfaces modified with MCHP demonstrated a marked reduction in water contact angle, indicating enhanced hydrophilicity, and maintained excellent resistance to nonspecific adsorption under varying environmental conditions.These findings suggest that MCHP-based polymers are promising candidates for achieving long-term surface stability and superior biocompatibility in biomedical materials, with prospective applications in hydrogels, drug delivery systems, and other advanced medical technologies.

Keywords: Biomaterial, Zwitterionic Polymer

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