Synopsis of Original Research Paper

Studies on water state in polymer with biomembrane-like structure and bioreactions on the polymer

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The amount of plasma proteins adsorbed on a phospholipid polymer having a 2-methacryloyloxyethyl phosphorylcholine (MPC) moiety was reduced compared to poly (2-hydroxyethyl methacrylate (HEMA)], poly [n-butyl methacrylate (BMA) J, and BMA copolymers with acrylamide (AA.in) or N-vinyl pyrrolidone VPy) moieties having a hydrophilic fraction. To clarify the reason for the reduced protein adsorption on the MPC polymer, the water structure in the hydrated polymer was examined with attention to the free water fraction. Hydration of the polymers occurred when they were immersed in water. The differential scanning calorimetric analysis of these hydrated polymers revealed that the free water fractions in the poly (MPC-co-BMA) and poly (MPC-co-n-dodecyl methacrylate (DMA)) with a 0.30 MPC mole fraction were above 0.70. On the other hand, the free water fractions in the poly (HEMA), poly (AAm-co-BMA) and poly VPy-co-BMA) were below 0.42. The conformational change in proteins adsorbed on the MPC polymers and poly (HEMA) was determined using ultraviolet and circular dichroism spectroscopic measurements. Proteins adsorbed on poly (HEMA) changed considerably but those on poly (MPC-co-BMA) with a 0.30 MPC mole fraction were almost the same as in the native state. We concluded from these results that little proteins are adsorbed and do not change their original conformation on the polymer surfaces which possess a high free water fraction.