СОБЛЮДЕНИЕ ЭТИЧЕСКИХ СТАНДАРТОВ

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Авторы заявляют об отсутствии конфликта интересов.

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Phagocytosis of Protein-Modified Polymer Microparticles by Immune Cells

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The ability of three model green proteins to covalently bind to microparticles (MP) based on poly(D,L-lactic acid) (PLA). Green fluorescent protein (sfGFP), recombinant human beta2-microglobulin-sfGFP fusion protein (β2M-sfGFP), and recombinant human amylin-sfGFP fusion protein (IAPP-sfGFP) were isolated by affinity chromatog-

raphy. The double emulsion method was used to form PLA-MPs. The modification of PLA MPs by proteins was testified using laser scanning microscopy (LSM). Phagocytosis of PLA-MPs modified with different proteins and free model proteins by macrophages was also studied using LSM. Recombinant sfGFP has been shown to bind to particle surfaces at lower levels compared to β2M-sfGFP and IAPP-sfGFP. Presumably, this is due to the fact that amino groups that could potentially react with activated carboxyl groups on particle surfaces, are spatially unavailable for this reaction due to the structure of sfGFP. β2M and IAPP within the corresponding recombinant proteins are spacer structures between the surface of spherical particles and sfGFP. It was also found that increasing the protein/particle ratio by a factor of three did not lead to an increase in the amount of bound protein per unit mass of particles, which may indicate that the amount of protein that can be bound per unit mass of particles is limited by the capacity of the particles themselves. The study of phagocytosis of PLA-MPs modified with model proteins revealed that MPs bearing β2M-sfGFP and IAPP-sfGFP were captured by macrophages and, therefore, contribute to the activation of the cellular immune response, which is important in the fight against various viral infections. In addition, model proteins (β2M-sfGFP, IAPP-sfGFP) appeared to be also capable of phagocytosis. This may be due to the fact that both β2M and IAPP are amyloidogenic and aggregation prone proteins. Apparently, the aggregates of these proteins are also able to be absorbed by macrophages due to the increase in size compared to their monomeric forms.

Keywords: microparticles, poly(lactic acid), protein immobilization, green fluorescent protein, virus “traps”, phagocytosis