

Conformal Coating Technology Applicable to Cell Therapeutics Using Click-Reactive Biocompatible Polymers

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Abstract : Cell-based therapies are limited due to underlying host immune system activity. Microencapsulation of living cells to overcome this issue has some serious drawbacks, such as limitations of nutrient and oxygen diffusion, which pose a threat to the function and longevity of cells. The conformal coating could overcome the issues which are generally involved in traditional microencapsulation. Some of the theoretical advantages of conformal coating include superior nutrient and oxygen supply to cells, prolonged lifespan, improved drug-secreting cell functionality and an opportunity to load high cell doses in small volumes. Despite several advantages to the conformal coating, there are no suitable methods available to apply to living cells. The ultra-thin conformal coating was achieved utilizing click-reactive methacryloyloxyethyl phosphorylcholine (MPC) polymers, which are capable of specifically reacting one polymer to another at neutral pH in the aqueous isotonic system at the desired temperature suitable for living cells without the need of deleterious initiators. ARPE-19 (Adult Retinal Pigment Epithelial cell line-19) cell-spheroids and rat pancreatic islets were used in the formulation studies. The in vitro studies of coated ARPE-19 cell-spheroids and rat islets indicate that the coat was intact; cells were viable and functioning. The in vitro study results revealed that the conformal coating technology seems promising and in vivo studies are being planned.

Keywords : cells, hydrogel, conformal coating, microencapsulation, insulin

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