

## EFFECT OF NANO HYDROXYAPATITE ON PROTEIN ABSORPTION OF POLY (LACTIC ACID)/ NANO HYDROXYAPATITE COMPOSITE MICROSPHERES

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Natural bone which has hydroxyapatite as an inorganic component is a composite with a collagen matrix. With the increase of bone defects nontoxic, biocompatible bone substitutes for bone regeneration are highly demanded. This research was focused on the preparation of poly (lactic acid)/ Nano-hydroxyapatite composite microspheres, evaluation of model protein bovine serum albumin absorption on the composite microspheres and finally observation of the cell attachment and proliferation. Through this study we aim to reveal the effects of Nano-hydroxyapatite on the biological properties of composite microspheres which can improve biomedical applications. Poly (lactic acid)/ Nano-hydroxyapatite composite microspheres have relatively large particle size (29.86  $\mu\text{m}$  for 10% composite), when compared to poly (lactic acid) microspheres (16.55  $\mu\text{m}$ ). The linear range for bovine serum albumin absorption was detected as 0 to  $1.8 \times 10^3 \text{ kgm}^{-3}$ . Through the increase of the amount of Nano-hydroxyapatite by 10%, 20% and 30% the bovine serum albumin absorption quantity of the composite microspheres increases. The cell adhesion and cell proliferation was examined by using rat Mesenchymal Stem cells and fluorescence microscopic results. The composite microspheres have higher cell adhesion and proliferation compared to pure poly (lactic acid) microspheres. Alkaline Phosphatase (ALP) staining exhibits that Nano hydroxyapatite has a significant influence on cell osteogenic differentiation emphasizing the composites have positive staining towards ALP staining. Accordingly, incorporation of Nano-hydroxyapatite to poly (lactic acid) matrix has significantly enhanced the surface protein absorption, cell adhesion, cell proliferation and osteogenic differentiation which ensure that composite microspheres can be used as an extracellular matrix in bone regeneration.

**Keywords:** *Poly (lactic acid), Nano hydroxyapatite, Composite microspheres, Protein absorption, Cell proliferation*