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Evaluation of the Effect of Magnetic Field on Fibroblast Attachment in Contact with PHB/Iron Oxide Nanocomposite

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Abstract : Through the recent two decades, the use of magnetic-property materials with the aim of target cell's separation and eventually cancer treatment has incredibly increased. Numerous factors can alter the efficacy of this method on curing. In this project, the effect of magnetic field on adhesion of PDL and L929 cells on nanocomposite of iron oxide/PHB with different density of iron oxides (1%, 2.5%, 5%) has been studied. The nanocamposite mentioned includes a polymeric film of poly hydroxyl butyrate and γ-Fe2O3 particles with the average size of 25 nanometer dispersed in it and during this process, poly vinyl alcohol with 98% hydrolyzed and 78000 molecular weight was used as an emulsion to achieve uniform distribution. In order to get the homogenous film, the solution of PHB and iron oxide nanoparticles were put in a dry freezer and in liquid nitrogen, which resulted in a uniform porous scaffold and for removing porosities a 100◦C press was used. After the synthesis of a desirable nanocomposite film, many different tests were performed, First, the particles size and their distribution in the film were evaluated by transmission electron microscopy (TEM) and even FTIR analysis and DMTA test were run in order to observe and accredit the chemical connections and mechanical properties of nanocomposites respectively. By comparing the graphs of case and control samples, it was established that adding nano particles caused an increase in crystallization temperature and the more density of γ-Fe2O3 lead to more Tg (glass temperature). Furthermore, its dispersion range and dumping property of samples were raised up. Moreover, the toxicity, morphologic changes and adhesion of fibroblast and cancer cells were evaluated by a variety of tests. All samples were grown in different density and in contact with cells for 24 and 48 hours within the magnetic fields of 2×10^-3 Tesla. After 48 hours, the samples were photographed with an optic and SEM and no sign of toxicity was traced. The number of cancer cells in the case of sample group was fairly more than the control group. However, there are many gaps and unclear aspects to use magnetic field and their effects in cancer and all diseases treatments yet to be discovered, not to neglect that there have been prominent step on this way in these recent years and we hope this project can be at least a minimum movement in this issue.

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