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Sustained delivery system for Bovine Serum Albumin (BSA) using Natural Rubber Latex (NRL) as matrix

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Abstract – Tissue engineering is an emerging field that provides an alternative solution to the treatment of diseases: like bone loss, osteoporosis and fracture. In this work, we propose NRL membranes as protein delivery system. For this purpose, BSA was incorporated into the NRL, by mixing it in solution for in vitro protein delivery experiments. The solutions of latex and BSA were polymerized at different temperatures, from -10ºC to 27ºC, in order to control the membrane morphology. Results showed that membranes polymerized at RT have the best potential for BSA release. For this membrane 68.4% of the initial BSA content inside NRL was released in 400 hours.

Tissue engineering is an emerging field that provides an alternative solution to the treatment of diseases: like bone loss, osteoporosis and fracture. Guided Bone Regeneration (GBR) technique, a barrier membrane is placed over the bone defect. This barrier membrane is placed over the bone defect to prevent the fibroblasts invasion in the healing site that results in a non-union of bone. Natural Rubber Latex (NRL) from *Hevea brasiliensis* is a natural healing substance of the tree. NRL membrane has interesting characteristics related to this work such as: it is easy to manipulate, low cost, can stimulate the natural angiogenesis, is a biocompatible material and presents high mechanical resistance [1-4]. In this work, we propose NRL membranes as protein delivery system [5]. For this purpose Bovine Serum Albumin (BSA) was incorporated into the NRL, by mixing it in solution for in vitro protein delivery experiments. The solutions of latex and BSA were polymerized at different temperatures, from -10ºC to 27ºC, in order to control the membrane morphology. These membranes were characterized by Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), as well as the Lowry Method to measure the BSA release. SEM and AFM microscopy analysis showed that the number, size and distribution of pores in NRL membranes varied depending on polymerization temperature, as well as its overall morphology. We have found that the morphology of the membrane is the predominant factor for higher protein release, compared with pore size and number of pores. We also verified that the rate release of BSA was controlled varying the polymerization temperature of the latex matrix. Particularly the NRL polymerized at room temperature (RT) has the best potential for BSA release. For this membrane 68.4% of the initial BSA content inside NRL was released in 400 hours, or in other words with a slow release rate. Our results showed that the sustained delivery system for BSA has been successfully developed based on NRL.

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