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ABSTRACTS

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FL:P37 **Study of Chitosan Addition in the PVP/PVAL Polymeric Blend - A System of Controlled Release of Drugs**

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The main objective of this project is the study of the addition of chitosan in the polymeric blend of PVP/PVAL to get a biocompatible hydrogel that can be used as a system of controlled release of drugs. The polymeric blend usage is a recent development that expanded the applications of the polymers, due to the improvement of the properties of a single polymer even if they appear to be conflicting. PVP and PVAL were chosen because they present the main required characteristics to the formation of a hydrogel, such as water absorption and crosslinked formation. The flexibility of the PVP was added with the mechanical resistance of the PVAL. The chitosan biological active polymer molecules addition is to increment the interaction between the hydrogel and the organism. With the concentrations of PVP and PVAL defined, solutions with different levels of chitosan were made to check which presented better properties through different assays, such as mechanical, viscosity and absorption in infrared.

FL:P38 **Evaluation of the Effects of Sustained Delivery Demineralized Bone Matrix (DBM) and Osteogenic Protein-1 (OP-1) on Fracture Healing, Osteoclast Activation in a Rat Femur Model**

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Fracture healing involves growth factors and cytokines and attempts at supplementing the natural process are being investigated. The relevance and clinical impact of this research is the potential to develop a sustained drug delivery system for osteoinductive agents which could provide a more efficient and cost-effective modality for management of open fractures with associated bone loss. It was hypothesized in this dissertation that: (1) Sustained release of osteogenic protein-1 (OP-1) or demineralized bone matrix (DBM) will induce healing faster than in sham animals and return to fracture strengths similar to control and greater than bones from sham animals; (2) Sustained release of OP-1 or DBM will induce bone formation as evidenced by histopathological staining, but only DBM will induce bone remodeling equivalent to control bone; (3) With immunohistochemical staining for inflammatory markers, sustained release delivery of DBM will demonstrate increased activity longer than OP-1 due to activation of osteoclasts as a part of bone remodeling; and (4) Sustained release of OP-1 or DBM will not induce untoward side effects in vital or reproductive organs. Ninety-six rats were divided into four equal groups (control, sham, DBM, and OP-1). The treatment groups underwent a surgical drill defect in the femur and were harvested at two, four, six, and eight weeks for testing. Biomechanical, histopathological, immunohistochemical evaluations were conducted by following standard laboratory protocols. Data demonstrated biomechanical results similar to previous studies with superiority of control bones at two, four, and six weeks and no significant differences at eight weeks. Histopathological sections showed progressive new bone formation in the DBM and OP-1 groups with increased cortical thickness with OP-1 and persistence of the defect site in the sham group. Treatment with OP-1 does not appear to provide the activation signal for osteoclasts based on immunohistochemical results. In conclusion, data obtained from this study provided significant information in bone research. The present research offers the possibility of treatment with DBM which may be capable of inducing formation of bone equivalent in strength and function to native bone with the presence of osteoclast activation and remodeling not seen with OP-1 treatment.

FL:P39 **In Vitro Study of Electrospun Nanofibrous Epigallocatechin Gallate-eluting Anti-adhesion Barrier Composed of Biodegradable Polymer**

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Post-operative adhesions are common and serious complications following surgery, as they can involve severe abdominal and pelvic pain, infertility and bowel obstruction. Several agents, such as fibrinolytic agents, anticoagulants, anti-inflammatory agents and antibiotics, have been employed. However, these agents alone did not prevent adhesion formation effectively because of their short-term residence. (-)-epigallocatechin-3-O-gallate (EGCG), a main polyphenolic component of green tea, is well-known for a wide range of pharmacological activities, including antioxidant, anti-proliferative, anti-inflammatory and anti-thrombotic effects. In this study, nanofibrous poly(lactic-co-glycolic acid, PLGA) meshes eluting EGCG were prepared via electrospinning and then characterized to evaluate their application potential to an anti-adhesion barrier. The amounts of EGCG released from the EGCG-eluting PLGA meshes can be controlled by composition rate on electrospun meshes. Proliferation of L-929 fibroblastic cells was inhibited by eluted EGCG. Electrospun nanofibrous EGCG-eluting PLGA meshes might be effectively used as an anti-adhesion barrier.

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FL:P40 **Development of Pseudoboehmites for Nanosystems to Release Acyclovir**

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The production of confined or adsorbed drugs in inorganic matrix has been increasing in areas like material science and pharmaceutical due to the possibility of the production of nanoadsorbed or encapsulated molecules with new properties like chemical stability, enhancing solubility and controlled release, what implies in new applications of materials. The present work, nanocomposite of acyclovir and a fine ceramic material, pseudoboehmite, was prepared. Pseudoboehmite is based on a monohydroxide aluminum oxide produced from a synthetic route using ammonium hydroxide and aluminum chloride as precursors in the sol-gel process. These systems had been characterized by the following techniques: MEV, TG/DSC, FTIR and UV-vis. The exposition of the drug to the pseudoboehmite at the dissolution equipment was at 37 °C and 100rpm for 30 minutes. With the purpose to observe the interaction of the drug with the adsorbent, it was obtained the concentration of the drug in the solution, before and after the adsorption, using the UV-vis spectroscopy technique. The acyclovir has increased its solubility in at HCl 0,1M, when the weight ratio of Pseudoboehmite: Acyclovir 1:1 was used.

FL:P42 **An Efficient Low-pH Range Sensitive Artificial Muscle for Future Active Implantable Systems**

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A chemo-mechanical muscle can be founded on the use of a shape changing external enveloppe inside which is placed a chemical agent reacting with a peculiar control input. In a previous work we have shown the feasability of using a McKibben-type braided structure filled with ion-exchange resins to design an original "pH muscle" whose produced force shows similarities with skeletal muscle behaviour(Sensors&Acuators A-phys. 150(1),124-130,2009). More recently, we have shown the possibility to control our prototype by ionic strength variations; this makes way for controlling the pH-muscle with low pH-range buffer solutions (European Conf. on Polymers, Graz (Austria), July 2009). It is now possible to control, in a pH-range of [4.5-8], a 10 cm long and 1 cm diameter artificial muscle generating a maximum force of about 80 N in some minutes. In this paper we analyse how to transform our actual prototype, whose reversible functioning needs distinct basic and buffer solutions tanks, into a future "muscle implant" for incontinence treatment. The proposed approach is based on a closed-cycle circulation through the muscle - generated by micro-pump - of a solution whose ionic strength change is produced by bio-compatible micro-organisms. The case of yeasts is more particularly studied.

FL:P43 **Osseointegration of Macroporous Titanium Alloy Obtained by PM with Addition of Gelatin**

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Studies on titanium and its alloys that are commonly used as biomaterials, often address bone-implant interface related problems. Improvements in bone-implant interface features determine the quality, bone repair time and thereby, clinical success of the implant. The goal of this study was to evaluate in rats, osseointegration of macroporous implants produced by the powder metallurgy (PM) method, and with controlled addition of gelatin. As a control group, samples of commercially pure titanium (cpTi) and Ti-13Nb-13Zr alloy obtained by the PM process were used. To obtain porous samples, at the most, 15 wt% of gelatin was added to the metal powders. The samples were heat treated in a vacuum oven and sintered at 1150°C. Osseointegration evaluation was performed in male Wistar rats, for 28 days. Morphological studies, optical microscopy and scanning electron microscopy (SEM) were carried out to qualitatively evaluate osseointegration. In this study, the PM process modified by addition of gelatin enabled porous metallic implants to be obtained. Pore sizes obtained by this technique allowed sufficient nourishment for cell survival. This could be attributed to the highly interconnected network of pores and channels enhancing the osseointegration and osseoconduction features of the porous alloy.