

# Biocharacterization of hydrogels based on poly(methacrylic acid) prepared by eco-friendly method

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**INTRODUCTION:** Inflammation process in human body can lead to many serious inflammation-related diseases. Hence, there are urge to find better solution for the treatment of the inflammation processes. Solution can be found in application of poly(methacrylic acid) hydrogels which have potential for targeted delivery and controlled release of drugs. These pH-sensitive hydrogels can swell at the pH values between 5 and 8, and release drug in the process. So, taking into account that pH value at the inflammation site is around 6, these hydrogels are materials of choice.

It is very important that the system for controlled release be prepared through mild and non-toxic conditions in order to preserve bioactivity of the drug and keep good impact on environment. Enzymes are good candidates for eco-friendly preparation of hydrogels, because these green substances can initiate polymerisation of various monomers.

**EXPERIMENTAL (or Materials and Methods):** In this study, hydrogels based on poly(methacrylic acid) were prepared through eco-friendly method by using enzyme/hydrogen peroxide (HP)/ascorbic acid (AA) as initiator. Two groups of the samples were prepared: in the first group peroxidase isolated from potato peel waste (with activity of 0.8 IU) was used in the initiation system, whereas in the second group peroxidase isolated from soya bean coats (with activity of 0.8 IU) was employed in the initiation system. The amounts of HP and AA in both series were 40  $\mu$ L and 10 mg, respectively. Anti-inflammatory drugs, dexamethasone (5 mg/mL) and diclofenac (4.5 mg/mL) were encapsulated in the first and the second group of the PMAA samples, respectively. Anti-inflammatory effect of the PMAA hydrogels with encapsulated drugs were tested on the Bovine Chondrocytes cells.

**RESULTS AND DISCUSSION:** Results showed that the level of pro-inflammatory mediators NO and IL-8 decreased. The PCR analysis showed that the proinflammatory TN $\alpha$ , IL-6 genes expression level decreased, the matrix catabolism MMP1 and MMP3 genes expression level decreased and the fibrotic COL2 and ACAN genes expression level increased.

**CONCLUSIONS:** The study showed that the PMAA hydrogels have anti-inflammatory effect and have potential for treatment of the inflammation processes.

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