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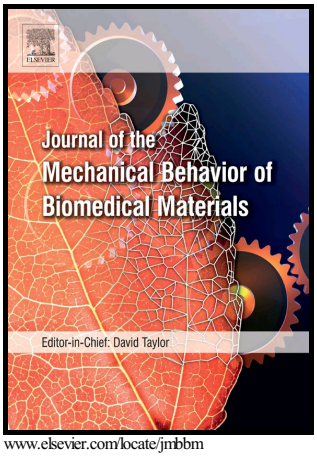

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Development and characterization of cross-linked gellan gum and retrograded starch blend hydrogels for drug delivery applications

Valéria Maria de Oliveira Cardoso[a], Beatriz Stringhetti Ferreira Cury[b,*], Raul Cesar Evangelista[b,†] , Maria Palmira Daflon Gremião[b]

† *in memorian*

[a] *Graduate Program in Pharmaceutical Sciences, Faculty of Pharmaceutical Sciences, São Paulo State University-UNESP, km 1 Araraquara-Jaú Road, Araraquara, SP, Brazil.*
[b] *Department of Drugs and Pharmaceuticals, Faculty of Pharmaceutical Sciences, São Paulo State University-UNESP, km 1 Araraquara-Jaú Road, Araraquara, SP, Brazil.*

* Corresponding author. Tel.: +55 16 33016961; fax: +55 16 33016960.
E-mail address: curybsf@fcfar.unesp.br
(Beatriz Stringhetti Ferreira Cury)

Abstract
The retrogradation of high amylose starch (5% or 10%), by isothermal cycles at 4 ºC (method 1) or by alternating thermal cycles (method 2) was efficient and promoted important structural modifications. Hydrogels of gellan gum and starch retrograded blends, containing or not ketoprofen, were prepared by ionic and dual cross-linking, at different concentrations of polymer and cross-linkers, and characterized by texture and rheological analysis, X-ray diffraction and morphological analysis. The ionic cross-linking and starch retrograded by method 1 contributed to the improvement of hardness and cohesiveness of hydrogels while the dual cross-linking and starch retrograded by method 2 favored the adhesiveness. The rising of polymer concentration lead to the improvement of all mechanical parameters. Rheological data demonstrated that non-cross-linked dispersions showed a behavior of weak gels and the cross-linked hydrogels presented a predominantly elastic behavior (G'>>G"), peculiar of strong gels. X-ray diffraction, rheological data and the scanning electron microscopy (FEG-SEM) revealed that the increase of polymers and cross-linkers concentration and the presence of drug resulted in stronger and more stable tridimensional structures. The suitable adhesiveness and high strength and elasticity of hydrogels H253IC-KT, H255IC-KT, H21053DC-KT and H21055DC-KT make them more promising materials for the design of mucoadhesive drug delivery systems.

Keywords: gellan gum, retrograded starch, hydrogels, rheology, structure, texture.