J Biol Phys (2007) 33:463–475
DOI 10.1007/s10867-008-9098-8

ORIGINAL PAPER

Thermal Characterization and Cytotoxicity of Complexes Formed by Papain and Cyclodextrin

Gustavo H. C. Varca · Newton Andréo-Filho · Leonardo F. Fraceto · Telma M. Kaneko · Humberto G. Ferraz · Natália M. Esteves · Michelle G. Issa · Mônica B. Mathor · Patricia S. Lopes

Received: 15 November 2007 / Accepted: 20 June 2008 /
Published online: 15 August 2008

Abstract Papain is a proteolytic enzyme with restricted applications due to its limited stability. Cyclodextrins are widely used in pharmaceutical formulations once they are able to form complexes with other molecules, improving their stability and bioavailability. The purpose of the present paper was to analyze complexes formed by papain/hydroxypropyl-β-cyclodextrin and papain/β-cyclodextrin by thermal analysis and cytotoxicity tests to verify their possible interactions and toxicological behavior. Complex solutions were prepared at different molar ratios and collected as a function of time to be lyophilized and analyzed. Results showed changes in endothermic events and cytotoxicity profiles. A complex formation for both complexes is observed; nevertheless, β-cyclodextrin was able to change the enzyme characteristics more efficiently.

Keywords Papain · Cyclodextrin · Cytotoxicity · Differential scanning calorimetry · Fibroblasts · Human keratinocytes

G. H. C. Varca · N. Andréo-Filho ·
N. M. Esteves · P. S. Lopes (✉)
University of Sorocaba, Sorocaba, Brazil
e-mail: patricia.lopes@uniso.br

L. F. Fraceto
UNESP, Sorocaba, Brazil

T. M. Kaneko · H. G. Ferraz · M. G. Issa
University of São Paulo, São Paulo, Brazil

M. B. Mathor
IPEN-CNEN, São Paulo, Brazil