



Enhanced Curcumin Supersaturation in Gastrointestinal Fluids by Polymeric Precipitation Inhibitors

Patcharawalai JAISAMUT ^{1,2}, Kamonthip WIWATTANAWONGSA ³,
Yaowaporn SANGSEN ^{1,2} & Ruedeekorn WIWATTANAPATAPEE ^{1,2} *

¹ *Phytomedicine and Pharmaceutical Biotechnology Excellence Research Center,*

² *Department of Pharmaceutical Technology,*

³ *Department of Clinical Pharmacy, Faculty of Pharmaceutical Sciences,
Prince of Songkla University, Hat-Yai, Songkhla, 90112, Thailand*

SUMMARY. Curcumin is a polyphenolic compound present in the rhizomes of turmeric. One of the serious drawbacks of curcumin is its poor aqueous solubility which leads to low oral bioavailability. In this study, the sustained supersaturation of curcumin in gastrointestinal fluids by polymeric precipitation inhibitors was evaluated. Various polymers classified as cellulose derivatives (HPMC), polyvinylpyrrolidone (PVP), and the cationic copolymer (Eudragit® E PO) were assessed in different gastrointestinal media. The equilibrium solubility of curcumin in all media depended on the types and quantity of the polymer. HPMC E4m (3% w/w) provided the greatest curcumin solubility among all polymer tested. For the degree of supersaturation-time profiles, a 1% w/w of HPMC E4m maintained a supersaturation state of curcumin that was superior to any of the other polymers for up to 120 min. Furthermore, the HPMC E4m produced an excipient gain factor of 19, 19 and 31 for curcumin in SGF, FaSSGF and SIF, respectively.

RESUMEN. La curcumina es un compuesto polifenólico presente en los rizomas de cúrcuma. Uno de los inconvenientes graves de la curcumina es su mala solubilidad acuosa, que conduce a una baja biodisponibilidad oral. En este estudio se evaluó la sobresaturación sostenida de la curcumina en los fluidos gastrointestinales por inhibidores de precipitación poliméricos. Varios polímeros tales como derivados de la celulosa (HPMC), polivinilpirrolidona (PVP) y el copolímero catiónico Eudragit® (E PO) se evaluaron en diferentes medios gastrointestinales. La solubilidad de equilibrio de la curcumina en todos los medios depende de los tipos y la cantidad del polímero. HPMC E4M (3% w/w) proporcionó la mayor solubilidad de curcumina entre todos polímeros probados. Para el grado de perfil de tiempo de sobresaturación, un 1% w/w de HPMC E4M mantiene un estado de sobresaturación de la curcumina superior a cualquiera de los otros polímeros para un máximo de 120 min. Además, HPMC E4M produjo un factor de ganancia de excipiente de 19, 19 y 31 de la curcumina en SGF, FaSSGF y SIF, respectivamente.

KEYWORDS: curcumin, polymer, precipitation inhibitor, solubility, supersaturation.

* Author to whom correspondence should be addressed. *E-mail:* ruedeekorn.w@psu.ac.th