Disintegration Test for Enteric-Coated Tablets

Enteric-coated dosage forms are intended to resist the release of their active ingredients in the acidic gastric fluid but to disintegrate and release their contents in the less acidic environment of the intestine. The official compendia recognize the use of enteric-coated dosage forms in situations where the drug may be destroyed or inactivated by the gastric juice or where it may irritate the gastric mucosa[1,2]. The compendia also recognize that such coatings are intended to delay the release of the medication until the dosage form passes through the stomach[1,2]. Therefore, the enteric coating must resist the release of its ingredient(s) in the stomach until gastric emptying can occur.

The official compendia specify disintegration test requirements for the enteric-coated tablet only, apparently because it is the only popular enteric-coated dosage form. The requirements of this disintegration test are met if the tablets show no evidence of disintegration, cracking, or softening in 1 hr in simulated gastric fluid TS maintained at 37 ± 2° but disintegrate completely in simulated intestinal fluid TS maintained at 37 ± 2° in a period equal to 2 hr plus the time limit specified in the individual monograph or, where only an enteric-coated tablet is recognized, for only the time specified in the monograph[3,4].

Thus, the test in its present form appears to fulfill the following two objectives: (*a*) prevent the disintegration, cracking, or softening of the tablets in 1 hr in the acidic environment, and (*b*) assure the disintegration of the tablets in the intestinal environment within a given period of time.

However, the test in its present form does not take into account the fact that the stomach residence time of enteric-coated tablets may not necessarily be 1 hr or less but may, in fact, vary greatly. For example, studies with various nondisintegrating solid dosage forms indicated an average residence time in the stomach ranging from 1.5 to 5.75 hr, with standard deviations of 50% from the mean[5,6]. Moreover, although the tablets may show no evidence of cracking (with the naked eye) or softening in the acidic gastric environment, they may be releasing their content(s) due to diffusion or leaching through the intact coating and/or small pores or minute cracks.

In a recent study dealing with commercially available enteric-coated sodium salicylate tablets[7], all products tested met the official test requirement but the coating on many of the products failed to prevent the release of sodium salicylate in the acidic environment. Recent evidence indicating that the local concentration of mucosal irritants at sites in contact with the tablets may be important and the fact that the enteric-coated tablet does not ensure safety from gastric toxicity[8] suggest that the present test requirement for the enteric-coated tablets may not be adequate.

Thus, to improve the performance of the disintegration test and enhance its validity, a more realistic test requirement should include "prevention of release" in the acidic environment as the primary objective.

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[1] "The United States Pharmacopeia," 19th rev., Mack Publishing Co., Easton, Pa., 1975, p. 706.
[2] "The National Formulary," 14th ed., Mack Publishing Co., Easton, Pa., 1975, p. 941.
[3] *Ibid.*, p. 980.
[4] "The United States Pharmacopeia," 19th rev., Mack Publishing Co., Easton, Pa., 1975, p. 650.
[5] F. S. Bukey and M. Brew, *J. Am. Pharm. Assoc., Sci. Ed.*, **23**, 1217 (1934).
[6] R. H. Blythe, G. M. Grass, and D. R. MacDonnell, *Am. J. Pharm.*, **131**, 206 (1959).
[7] P. L. Madan and M. Minisci, *Drug Intel. Clin. Pharm.*, **10**, 588 (1976).
[8] R. J. Ferrand, J. H. Green, and C. Hawroth, *Br. Med. J.*, **3**, 85 (1975).