References

- 1 Habibullah CM, Mujahid Ali M, Ishaq M, Prasad R, Rratap B, Saleem Y. Study of duodenal ulcer disease in 100 families using total serum pepsinogen as genetic marker. *Gut* 1984; **25**: 1380-3.
- 2 Mirsky IA, Futterman P, Kaplan S. Blood plasma Pepsinogen. II. The activity of the plasma from 'normal' subjects, patients with duodenal ulcer, and patients with pernicious anaemia. *J Lab Clin Med* 1952; **40**: 188-9.

Sticking of dosage forms in the gastrointestinal tract

SIR,—In recent months there has been a number of reports or suggestions concerning the 'sticking' of dosage forms in the gastrointestinal tract. The term 'sticking' is an unfortunate choice, as it is not always clear whether an author or reported speaker is referring to obstruction, periods of stagnation, or to actual adherence to the gastrointestinal mucosa. Studies on the gastrointestinal transit of dosage forms in man show clearly that there are periods of stasis especially in the region of the ileocaecal junction and at the hepatic and splenic flexures of the colon. Such periods of delayed transit occur for all types of dosage form (pellets, single units) and it is not unusual to observe a formulation resident in the ileocaecal region for periods in excess of four hours. There is no evidence, however, to suggest that this is because of physical adherence of the dosage form to the mucosa. *In vitro* tests conducted on isolated oesophagus^{2,3} or even glass beakers,⁴ have shown that certain single unit dosage forms can adhere, but such tests are hardly relevant to the normal physiological situation. Nevertheless, the hydroxypropylmethylcellulose film coating of an osmotic pump containing indomethacin (Osmosin) was judged to be responsible for reported adverse reactions to this formulation. A recent study showed, however, that the Osmosin formulation was far less adherent than conventional gelatin based capsule systems.⁵ Studies of the gastrointestinal transit of placebo Osmosin tablets lend no support to the speculation that these devices stick to the gut.⁶

Various authors have studied the question of oesophageal transit of dosage forms in man. Both tablets and capsules can be retained in the oesophagus in patients^{7,8} and tablets have been reported to have a much greater liability for retention than

capsules.⁹ It is clear from these clinical studies that capsules and tablets should be administered only after a lubricating bolus of water, followed by a further swallow of water.¹⁰ Posture is another important factor because the occurrence of oesophageal retention is enhanced in supine subjects.¹¹ Patients, or those responsible for dose administration to patients, should be aware that dosage forms, whether they are tablets or capsules, should be taken with a drink, whilst in an upright posture.

C G WILSON, J G HARDY, AND S S DAVIS

*Department of Physiology and Pharmacology,
Department of Medical Physics,
Queen's Medical Centre, Nottingham NG7 2UH,
and Department of Pharmacy,
University of Nottingham,
University Park, Nottingham NG7 2RD.*

References

- 1 Day TK. Intestinal perforation associated with osmotic slow release indomethacin capsules. *Br Med J* 1983; **287**: 1671-72.
- 2 Marvola M, Vahervuo K, Sothmann A, Marttila E, Rajaniemi M. Development of a method for study of the tendency of drug products to adhere to the esophagus. *J Pharm Sci* 1982; **71**: 975-7.
- 3 Florence AT, Salole EG, Al-Dulaili H. Osmosin tablets. *Pharm J* 1984; **232**: 308.
- 4 Noormohammadi A. Osmosin tablets. *Pharm J* 1984; **232**: 527.
- 5 Swisher DA, Sondelbeck, SL, Fara JW. Adherence of various dosage forms to the oesophagus. *Int J Pharm* 1984; **22**: 219-28.
- 6 Wilson CG, Hardy JG. Gastrointestinal transit of an osmotic tablet drug delivery system. *J Pharm Pharmacol* 1985; **37**: 573-5.
- 7 Channer KS, Virjee JP. Effect of posture and drink volume on the swallowing of capsules. *Br Med J* 1982; **285**: 1702.
- 8 Kikendall JW, Friedman AC, Oyewole MA, Fleischer D, Johnson LF. Pill-induced esophageal injury. *Dig Dis Sci* 1983; **28**: 174-82.
- 9 Evans KT, Roberts GM. Where do all the tablets go? *Lancet* 1976; **2**: 1237-9.
- 10 Ponto JA. Esophageal retention of capsules [letter]. *Am J Hosp Pharm* 1983; **40**: 38-44.
- 11 Fisher RS, Malmud LS, Applegate G, Rock E, Lorber SH. Effect of bolus composition on esophageal transit: Concise communication. *J Nucl Med* 1982; **23**: 878-82.