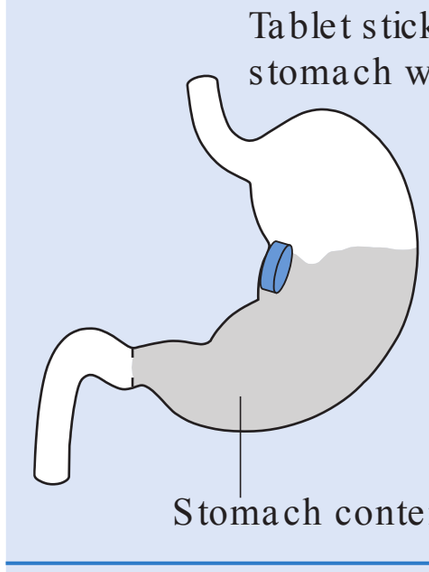
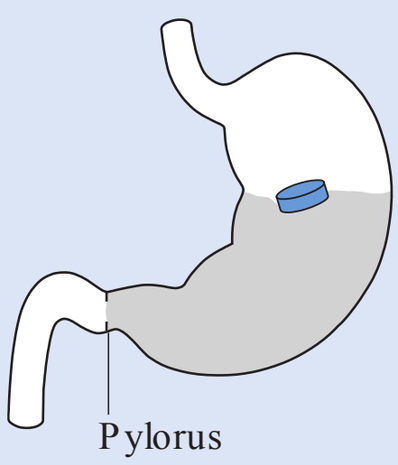
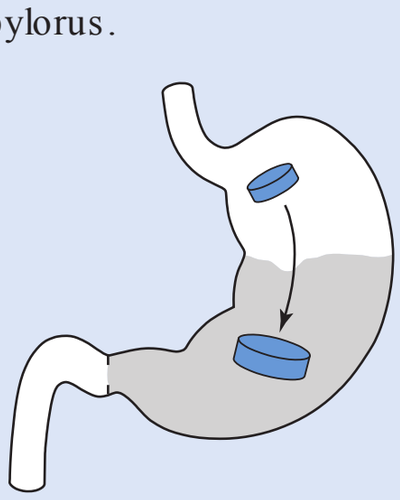
Table 31.3 An overview of some of the popular research areas for achieving gastroretention (including some formulation and biopharmaceutical considerations)

Approach to achieve gastroretention	Concept	Formulation considerations	Biopharmaceutical comments
Mucoadhesion 	Mucoadhesive polymers could theoretically adhere a dosage form to the stomach mucosa to retain it in the stomach.	Chitosan, Carbopol, polycarbophil are mucoadhesive polymers which have been researched (with limited success)	Although animal studies suggest this to be a sound concept, it has not been realized in man, probably due to the fast mucus turnover and high motility of the stomach.
Floating 	Dosage form should float on the stomach contents, thus avoiding gastric emptying.	Gas generating agents like bicarbonate can be used, or lipids.	Requires food to be present in the stomach. Has not shown clinical success for drug delivery but agents like Gaviscon which form a raft on stomach contents have been used for heartburn and indigestion.
Size increasing systems 	A dosage form that swells and increase in size as soon as it reaches the stomach to avoid being able to pass through the pyloric sphincter.	Swellable polymers such as hydroxypropyl methyl cellulose, polyethylene oxide, and xanthan gum have all been investigated.	Some marketed products use this approach but need to be given in the fed state and gastric emptying is delayed primarily by the effect of food on the stomach. The resting size of the pylorus (open) is around 10–11 mm but it can stretch further than this.