
Departmental Seminar

Seminar Title	: Exploring the significance of intestinal peristalsis in the bile salt metabolism and transit in the antro-pyloro-duodenal segment using a computational fluid dynamics approach
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Venue	: BM Department Seminar Room
Date and Time	: 23 Jul 2024 (3:00 PM)
Abstract	: Bile salts play a key role in the digestion, especially the metabolism of the fatty components of the meal by allowing for emulsifying large fat droplets into micelles. The process is chemically driven, however to facilitate the higher rate of digestion, the small intestinal peristalsis comes at a significant advantage by reducing the kinetic of the rate reaction and accelerating the process of micelle formation in the duodenum. This increases the surface area of enzymatic cleavage by lipases and digestion of fat. The process is dynamic and requires the coordination of the antral, pyloric and duodenal motility to regulation of flow across the stomach and the duodenum. By considering the bile salt components as reactive species, a reaction-diffusion transport model is developed to assess the role of peristalsis in the bile salt metabolism and transit. The lubrication approximation of the flow is developed by considering power-law model of the fluid. The transport of the bile salt and the derivatives was quantified for various duodenal motility patterns by considering the following peristalsis parameters – elementary contraction (APW, RPW, SW), wavelength, velocity and occlusion of the wave, and frequency of the contraction. Results of the bile transport are presented for the duodenal peristalsis, its impact on the kinetics of bile salt metabolism and digestion of fat. Keywords: Bile salts, Bile Reflux; Duodenogastric Reflux; Peristalsis; Duodenal Peristalsis; Small Intestinal Motility; Lubrication theory; Fluid Dynamics.