Scilight

NEWS | NOVEMBER 09 2022

Simulated stomach breaks down importance of motility FREE

Chris Patrick

Scilight 2022, 461110 (2022)
https://doi.org/10.1063/10.0015146

AIP Publishing

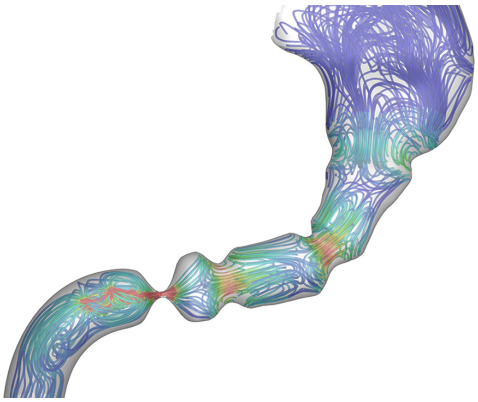
Scilight

9 November 2022

Simulated stomach breaks down importance of motility

Chris Patrick

Computational model of the human stomach could help researchers better understand digestion, treat diseases, and design food.



The human stomach is vital to digestion, but questions remain regarding how this organ breaks down food. A combination of stomach wall peristaltic motion – the automatic wave-like movement of muscles – and enzyme secretion initiates digestion. Because this complex process is difficult to study experimentally, Kuhar et al. developed a computational model of the human stomach that mimics its physical and chemical behavior.

They built this realistic model, called StomachSim, using MRI measurements of geometry and motility as well as rates of enzyme secretion from the stomach wall. The model exhibits the flow field throughout the stomach and simulates the chemical breakdown of food.

Certain diseases, including diabetes and gastroparesis, can weaken the peristaltic motion of stomach walls. The model showed that this lower motility impedes the mixing and emptying flow and reduces the rate of chemical breakdown.

“The stomach is central to many modern health conditions, and this model can help us in understanding the mechanism behind them,” said author Sharun Kuhar. “Carrying out these tests in an experimental setting on live subjects would not only be much more costly and time intensive, but would also be ethically challenging.”

In addition to modeling aspects of disease, StomachSim could help plan surgeries, diagnose diseases, and even design functional foods. To make their model suitable for these applications and beyond, the authors will continue to add complexity to StomachSim. In this study, the authors simulated the mixing, breakdown, and emptying of a liquid meal. Next, they will model digestion of a solid meal.

Source: “Effect of stomach motility on food hydrolysis and gastric emptying: Insights from computational models,” by Sharun Kuhar, Jae Ho Lee, Jung-Hee Seo, Pankaj J. Pasricha, and Rajat Mittal, *Physics of Fluids* (2022). The article can be accessed at https://doi.org/10.1063/5.0120933.