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Coupled Chemo-Fluidic Computational Modeling of Drug Dissolution in the Human Stomach[1] JUNG-HEE SEO, RAJAT MITTAL, Johns Hopkins University — The oral route is used most frequently for drug administration in humans but it is also the most complex way for an active pharmaceutical ingredient (API) to enter the body. This complexity is because drug absorption via the gastrointestinal tract depends not only on factors related to the drug, but also the fluid dynamics and stomach motility. The current approach to quantifying drug dissolution relies primarily on in-vitro models, but a variety of studies have shown the significant shortcomings of in-vitro devices for mimicking the conditions of the stomach. Computational modeling of drug dissolution in biomimetic models of the stomach have the potential to overcome many limitations of in-vitro models. In this study, we model the drug dissolution in the anatomical model of stomach using the immersed boundary method based, fluid-structure interaction simulations. The pill dissolution and release of API are resolved by directly solving the convection-diffusion equation. The pill trajectory, local API concentration, and the interaction with the flow on the dissolution characteristics are analyzed.

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