

Abstract Submitted  
for the DFD05 Meeting of  
The American Physical Society

**How Does the Stomach Pump?—A Fluid Dynamics Discovery**

ANUPAM PAL, JAMES BRASSEUR, Pennsylvania State University, BERTIL ABRAHAMSSON, AstraZeneca, Sweden — The stomach is a pump that empties viscous liquid from a flexible bag (fundus) through a valve (pylorus) by slow squeeze of fundic muscle. In addition, peristaltic contraction waves (CW) travel periodically towards the pylorus in the lower stomach to grind/mix content. As each CW approaches the pylorus, it deepens and the pylorus momentarily closes. Since liquid empties from the pyloric region, one expects content at the farthest reaches of the stomach to empty last. To study the patterns of gastric emptying we applied the lattice Boltzmann method with moving boundary conditions coupled with a stomach geometry model parameterized using MRI. By marking fluid particles leaving the stomach over a 10 min period, we discovered that the CWs create a *narrow path of emptying*, or “Magenstrasse” (stomach road) that directs content from the farthest reaches of the stomach to the pylorus with relatively little mixing. Thus, while drug released off the Magenstrasse (MS) can take an hour or more to empty at low concentration, when released on the MS the drug empties within 10 minutes at high concentration—a discovery with potential implications to other pumping systems.

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Date submitted: 11 Aug 2005

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