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Why don't rats and mice vomit? A behavioral and anatomical investigation

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Laboratory rats and mice are known to lack a vomiting response and the dimensions of the abdominal esophagus might be an important constraint (Andrews, 1995, *Physiol. Zool.*). However, a broad evaluation of Rodentia is lacking. Here we determined the behavioral responses and esophageal and diaphragm anatomy from 4 of the 5 Suborders. We used prototypical emetic agents, apomorphine (s.c.), veratrine (s.c.), and copper sulfate (i.g.), which are thought to produce emesis by action on the area postrema, nodose ganglia, and vagal afferent fibers, respectively. None of the rodents, including nutria (*Myocastor coypus*), beavers (*Castor canadensis*), mountain beavers (*Aplodontia rufa*), voles (*Microtus townsendii*), guinea pigs, and laboratory rats and mice vomited. In rodents, ~72% of the diaphragm area was muscle compared to 100% in emetic control species (musk shrews and cats). The abdominal esophagus was also relatively long and narrow in rodents (esophageal circumference/length $\leq$0.7, rodents, vs. $\geq$0.8 in emetic species). These data indicate, (1) a lack of vomiting is a common feature in rodents, and (2) rodents might have anatomical constraints on their ability to vomit.

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