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In reply:—We appreciate Eyler's and Zaccari's interest in our article and share their concern about our *in vitro* results comparing particulate antacids with clear antacids.^{1,2} To determine how such disparate results could have occurred, we repeated our experiment with their comments in mind. The results for the amount of hydrochloric acid "neutralized" by sodium citrate remained the same. The results with the particulate antacids, as we performed the experiments, also remained the same. When we performed our original experiments we merely added hydrochloric acid to the antacids (both clear and particulate). We did not stir the mixture as we added the acid, believing that such mixing probably would not take place *in vivo*. The two liquids appeared to mix reasonably well, although not completely. There was no layering or precipitation initially. We waited approximately one minute following each 100-ml addition of hydrochloric acid and then measured the pH of the mixture. We did not continue to monitor the pH over time, knowing that the time from administration of an antacid to induction of anesthesia is often quite short. After reviewing Eyler's and Zaccari's letter, we felt it necessary to perform the same experiments noting the effects of mixing and time.

To determine the effect of mixing we performed the experiments with Mylanta® and Kolantyl Gel® as before, except that the resulting mixture was continuously agitated by a magnetic stirrer. When performed in this manner, the pH did not fall below 2.5 until 1,800 ml of pH 1.5 hydrochloric acid was added to 30 ml of Kolantyl Gel and 2,100 ml were added to 30 ml of Mylanta. Once a pH of 2.5 was reached, it remained stable at that level for 90 min.

To determine the effect of time, we again performed the experiment in our original manner, but continued to monitor pH over time. Again, 300 ml of pH 1.5 hydrochloric acid added to 30 ml of Mylanta and 360 ml added to 30 ml of Kolantyl Gel lowered the pH to below 2.5 at one minute. The pH stabilized at this level for approximately one-half to one minute and then increased steadily. Within seven to ten minutes from the initial HCl addition, the pH was 4.0 and stayed at that level for 30 min. The passage of time also had another effect. Precipitation of the insoluble particles occurred, and by five minutes there was a sediment layer on the bottom. From bottom to top the solution became more clear, *i.e.*, contained less particulate matter. Acidity measurements at three levels (Mylanta only) revealed the pH to be 6.5 on the bottom, 4.4 in the middle, and 4.4 on top. Repetitions of this experiment produced qualitatively similar results, although actual values were influenced by the degree of precipitation that had taken place.

Obviously, time and mixing are important when evaluating the capacity of particulate antacids for neutralizing acids. In retrospect, it is apparent that our experiments did not determine the full potential of the particulate antacids studied, and thus the results in this respect were misleading. For this error we apologize and thank Eyler and Zaccari for discovering our error. For those who wish to study antacids in the future, Fordtran and colleagues have provided proper guidelines.³

We hope, however, as Eyler and Zaccari suggest, the readers of ANESTHESIOLOGY will realize that sodium citrate is a safe and clinically effective antacid when used preoperatively to elevate the pH of stomach contents. It is safe because it does not produce the pulmonary lesions seen with particulate antacid, and our *in vivo* studies clearly demonstrate its clinical effectiveness.² Furthermore, time and mechanical agitation apparently are not required for maximal effectiveness, as is the case with particulate antacids. These corrected studies, as well as those of Eyler and Zaccari and those of Holdsworth *et al.* demonstrate these latter points.⁴ Additionally, Toung and Cameron have provided clinical evidence that the layering effect may be another reason why particulate antacids are not effective in preventing serious sequelae of aspiration. In their study, they demonstrated that gastric contents could have pH values above 2.5 at one level and less than 2.5 at another.⁵

Finally, we hope that we have not misled the readers of ANESTHESIOLOGY and that Eyler's and Zaccari's letter as well as this response have provided more complete and accurate information.

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