Competitive Speed Eating: Truth and Consequences

Marc S. Levine1  
Geoffrey Spencer2  
Abass Alavi3  
David C. Metz2

OBJECTIVE. The purpose of our investigation was to assess the stomachs of a world-class speed-eating champion and of a control subject during a speed-eating test in our gastrointestinal fluoroscopy suite to determine how competitive speed eaters are able to eat so much so fast.

CONCLUSION. Our observations suggest that successful speed eaters expand the stomach to form an enormous flaccid sac capable of accommodating huge amounts of food. We speculate that professional speed eaters eventually may develop morbid obesity, profound gastroparesis, intractable nausea and vomiting, and even the need for a gastrectomy. Despite its growing popularity, competitive speed eating is a potentially self-destructive form of behavior.

Since the inaugural Fourth of July Hot Dog Eating Contest at Nathan’s flagship restaurant in Coney Island, NY, in 1916, this annual contest has become the premier event and de facto Olympics in the sport of competitive speed eating [1]. The contestants are also known as gustatory athletes, “gurgitators,” and, in France, as “epicuriators.” The past decade has seen an explosive growth in speed-eating competitions not only in the United States, but also in Canada, Germany, England, Russia, Japan, Thailand, and Scotland. The rise of speed eating as a competitive sport has led to the development of the International Federation of Competitive Eating (IFOCE), which organizes, promotes, and publicizes a series of speed-eating contests each year both in the United States and overseas [1].

Public interest in competitive speed eating has resulted in coverage from such diverse media outlets as CNN, “NBC Nightly News,” “The Today Show,” Sports Illustrated, The New York Times, the Los Angeles Times, TIME magazine, and the Smithsonian magazine [1].

The contestants are professional speed eaters who compete in events on an international circuit sanctioned by the IFOCE. These sanctioned competitions have led to a formal ranking of the top 50 speed eaters on the worldwide circuit. Currently, the number one ranked speed eater is Takeru Kobayashi from Nagano, Japan, a competitor who dominated the sport in 2006, winning the annual Nathan’s Fourth of July Hot Dog Eating Contest for the fifth consecutive year, when he consumed 54 Nathan’s Famous Hot Dogs and buns in 12 minutes [1]. Kobayashi holds world records in five separate categories, including hot dogs, hamburgers, brats, rice balls, and cow brains [1].

Competitive speed eating has become so popular that Philadelphia hosts an annual competition at the Wachovia Center (home of the Philadelphia 76ers and Philadelphia Flyers) known as Wing Bowl [2]. This buffalo-style chicken wings contest is broadcast live by WIP (AM) radio, a Philadelphia sports talk channel. Although this event is not sanctioned by the IFOCE, the annual Wing Bowl routinely draws crowds of 20,000 or more to the Wachovia Center—larger crowds than those generally attending professional basketball and hockey games played in this arena. The immense popularity of Wing Bowl reflects the emergence of speed eating as a major competitive sport with a growing legion of worldwide fans.

Health Concerns

Competitive speed eaters are much less likely to suffer athletic injuries than professional athletes in other sports such as football, basketball, and hockey. That does not necessarily mean, however, that speed eating is a safe sport. In fact, concern about potential risks to the competitors has caused the IFOCE to institute a policy in which all sanctioned speed-eating competitions are supervised and regulated to help ensure the safety of the sport [1]. To our knowledge, no cases of gastric perforation, Boerhaave’s syndrome, or Mallory-Weiss syndrome have been reported in this population.

Keywords: barium studies, fluoroscopy, gastric physiology, gastroparesis, speed eating, stomach

DOI:10.2214/AJR.07.2342

M. S. Levine is a consultant for E-Z-EM.

Address correspondence to M. S. Levine (marc.levine@uphs.upenn.edu).

1Department of Radiology, Hospital of the University of Pennsylvania, University of Pennsylvania School of Medicine, 3400 Spruce St., Philadelphia, PA 19104.

2Division of Gastroenterology, Department of Medicine, Hospital of the University of Pennsylvania, University of Pennsylvania School of Medicine, Philadelphia, PA.

3Division of Nuclear Medicine, Department of Radiology, Hospital of the University of Pennsylvania, University of Pennsylvania School of Medicine, Philadelphia, PA.

AJR 2007; 189:681–686

© American Roentgen Ray Society

AJR:189, September 2007 681
tare have been reported as a sequela of competitive speed eating. On the other hand, we know of no studies on the short- or long-term effects of speed eating on its competitors. Nor are there any data in the literature about the science of speed eating and how its competitors are able to consume such enormous quantities of food in such short periods of time.

We recently had the opportunity to assess the stomach of a world-class speed-eating champion and a control subject during a speed-eating test in our gastrointestinal fluoroscopy suite. We therefore present our preliminary observations and speculate about the long-term ramifications of competitive speed eating for its participants.

**Speed-Eating Test**

**The Participants**

A 29-year-old competitive male speed eater came to our institution to film a National Geographic special on the science of speed eating. He currently is ranked by the IFOCE as one of the top 10 competitive speed eaters in the world, holding individual records in three food categories. Despite his prodigious eating skills, he was surprisingly slim and fit, with a height of 5 ft 10 inches (178 cm) and a weight of 165 lb (75 kg). Given his auspicious credentials, we believed this individual was representative of the top echelon of competitive speed eaters and therefore concluded that his physiologic responses to a simulated speed-eating event were likely to be similar to those of other competitive speed eaters. Because our goal was to observe the physiologic effects of speed eating on the stomach in our fluoroscopy suite, and because this type of observational study has not been performed previously, we thought it important to have a control for comparison. A 35-year-old male control subject was chosen because he had a hearty appetite and because he was larger than the competitive speed eater, with a height of 6 ft 2 inches (188 cm) and a weight of 210 lb (95 kg).

Before testing, both study subjects signed standard university “Consent to Record and Release” and “Authorization for Use and/or Disclosure of Protected Health Information Including Recordings” forms and standard consent forms notifying them of the potential risks associated with the studies, including exposure to radionuclides and ionizing radiation. Our institutional review board was satisfied with the consent process and approved submission of the manuscript for publication.

**Preliminary Testing**

It is presently unknown whether speed eaters are born with the ability to rapidly ingest vast amounts of food or whether they are able to train their stomachs to perform in this manner during competitions. When speed eaters have been questioned on this subject, some thought that they always had this ability but that training helped to hone their skills. It could well be that these skills result from a combination of an inherently compliant stomach and adaptive training. Speed eaters describe varying methods of training for competition. Some ingest vast amounts of cabbage, and others ingest increasing amounts of other specific food items to prepare for these events. Many speed eaters also use water loading as a means of expanding their stomachs without ingesting unneeded calories. (We caution readers who may wish to try this at home that such behavior may be associated with adverse side effects, including hypothermia, water intoxication, and cerebral edema.) Fortunately, water load testing has been well described and validated in normal individuals and in patients with dyspepsia [3].

We performed two different water load tests on our subjects. The WL5 was performed by having the subjects drink room-temperature water at their own pace during a 5-minute period or until they felt sated (normal, 648 ± 204 mL), and the WL100 was performed by having the subjects drink room-temperature water at a rate of 100 mL/min until they felt sated (normal, 1,128 ± 355 mL) [3]. Both subjects exhibited higher than normal capacities with both water load tests, but the competitive speed eater outperformed the control subject by a large enough margin that the tests were terminated prematurely (WL5 results of < 2 L vs 4.5 L [stopped before 2 minutes] and WL100 results of 2 L vs 2.4 L [stopped before subjects felt sated], for the control subject and the competitive speed eater, respectively). These studies indicated that the competitive speed eater either could sequester larger volumes of ingested fluid in his stomach or could empty his stomach more quickly than the control subject.

We also performed solid-phase nuclear gastric emptying scanning [4] on our participants to help determine which of these two mechanisms is more important for competitive speed eating. The professional speed eater emptied only 25% of the radioactive meal at 2 hours, whereas the control subject emptied 75% of the meal at 2 hours (the normal rate for solid-phase gastric emptying at 2 hours is > 50% at our institution). Although it is difficult to extrapolate from a sample size of one, these data suggested that competitive speed eaters are able to consume unusually large volumes of food before feeling sated because of increased gastric accommodation rather than because of more rapid gastric emptying in comparison with control subjects.

**Setup**

Both participants were asked to consume as many hot dogs as possible during a 12-minute period, the standard time allotted for a hot dog eating contest. In actual speed-eating events, the competitors typically eat the hot dogs on buns, often lubricating the buns with water to facilitate rapid swallowing. Because of concern that water might dilute preingested barium in the stomach, a decision was made to have the subjects eat the hot dogs without buns for this speed-eating test.

The participants were both asked to lift their shirts before and after eating hot dogs so we could assess any physically evident changes in the appearance of their abdomens. They were then positioned on the fluoroscopy table and asked to ingest an effervescent agent (Baros, Mallinckrodt Pharmaceutical) and a standard dose of high-density barium (E-Z-HD, E-Z-EM) in the upright position before being rotated on the table in a recumbent position to coat the stomach with barium. Several spot images of the stomach were obtained to document the appearance of the stomach and duodenum immediately before the speed-eating test. We anticipated that the ingested hot dogs would appear as lesions etched in white by residual barium in the stomach or as filling defects in the surrounding barium pool. No pharmacologic agents were administered, and both subjects had nothing by mouth on the day of the test. The subjects were placed in a semipractical position on the fluoroscopy table for the speed-eating test to facilitate ingestion of the hot dogs. Intermittent fluoroscopy of the stomach was performed to observe the physiologic effects on the stomach, and occasional spot images were obtained to document the fluoroscopic findings.

**Speed-Eating Test**

The control subject was our first participant. When he lifted his shirt at the outset, his abdomen was flat. A preliminary double-contrast examination showed a normal-appearing stomach with free emptying of barium into the duodenum and no evidence of gastric dilatation or retained fluid or debris (Fig. 1A). Normal gastric peristalsis was observed at fluoroscopy.
The control subject then began eating hot dogs one at a time as rapidly as possible. As he consumed the hot dogs, intermittent fluoroscopy showed hot dog pieces in the stomach without evidence of gastric distention (Fig. 1B). After eating a total of seven hot dogs, the control indicated that he felt an uncomfortable sensation of fullness and satiety and that he would be “sick” if he ate another bite, so this portion of the test was terminated. Final fluoroscopic images of the stomach showed progressive accumulation of hot dog pieces (arrows) in stomach and minimal gastric dilatation.

Fig. 1—Appearance of stomach in 29-year-old male control subject on double-contrast barium study during rapid ingestion of seven hot dogs for speed-eating test. A, Preliminary frontal spot image of stomach shows normal-appearing stomach with no evidence of gastric dilatation or retained debris. Gastric peristalsis was normal at fluoroscopy. B, Repeat frontal spot image during speed-eating test shows hot dog pieces (arrows) in stomach and no gastric distention. Note barium in small bowel. C, Final frontal spot image (after control subject had ingested seven hot dogs) shows progressive accumulation of hot dog pieces (arrows) in stomach and minimal gastric dilatation.
showed mild gastric distention with noticeably decreased gastric peristalsis at fluoroscopy (Fig. 2A), although some barium emptied into the duodenum. No retained fluid or debris was in the stomach.

The speed eater then began consuming hot dogs two at a time to facilitate rapid ingestion. It was truly remarkable how quickly he downed each pair of hot dogs without any noticeable letup during the test. As he ate the hot dogs, intermittent fluoroscopy revealed progressive accumulation of an ever-increasing volume of hot dog pieces outlined by residual barium in the stomach (Fig. 2B). There was little if any gastric peristalsis with increasing gastric distention. Fluoroscopy also revealed intermittent accumulation of hot dog pieces in the distal esophagus, as their progress into the stomach was impeded by food in the fundus (Fig. 2B). At 6 minutes, the stomach had become a dilated, flaccid sac in the upper abdomen (Fig. 2C). At 10 minutes, the speed eater had eaten a total of 36 hot dogs. His stomach now appeared as a massively distended, food-filled sac occupying most of the upper abdomen (Fig. 2D), with little or no gastric peristalsis and emptying of a small amount of barium into the duodenum.

Despite the speed eater’s insistence that he felt no sensation of satiety, fullness, bloating, or abdominal discomfort, we became concerned that further dilation of his already enormous stomach could be associated with a small theoretic risk of gastric perforation. Therefore, a decision was made to terminate the speed-eating test over the objections of our participant. When the speed eater lifted his shirt afterward, his previously flat abdomen protruded enough to create the distinct impression of a developing intrauterine pregnancy. It would have been interesting to obtain follow-up radiographic images over a period of several days to determine how much time was required for his stomach to shrink to its original size, but the speed eater had other commitments that made this unfeasible. He did indicate, however, that his abdomen usually became flat again over a period of several days after a speed-eating competition (during which time he ate nothing) without any regurgitation of the ingested food items, so we assume his stomach gradually emptied its contents and returned to its original size during this period.

**Truth**

Competitive speed eating, by definition, entails the rapid consumption of unusually large quantities of food, a nearly impossible feat for those without experience or training in this sport. In our opinion, average eaters have as much chance of ingesting 50 hot dogs in 12 minutes as executing a triple axel on the ice or running a 4-minute mile. How then are competitive speed eaters able to eat so much so fast?

Logic and gastric physiology suggest two possibilities. Either the speed eater’s stomach empties much faster than a normal stomach, or the speed eater’s stomach is capable of expanding to the point that it can accommodate the rapid influx of an enormous quantity of food. Our water load tests and solid-phase nuclear gastric emptying scans suggested the latter scenario, which subsequently was confirmed during our speed-eating test.

Unlike the control subject, the speed eater had markedly altered gastric physiology that enabled his stomach to rapidly accommodate an enormous quantity of ingested food by progressively expanding until it became a giant, flaccid sac occupying most of his upper abdomen (Fig. 2). In other words, his stomach acted as a compliant, expandable receptacle, dilating to a degree that it could accept an almost unlimited volume of food. Conversely, gastric peristalsis was absent or near absent, so virtually none of the consumed hot dogs emptied into the duodenum.

We recognize that we may be extrapolating unfairly based on a sample size of one, and that fluoroscopic observation of a series of speed eaters is needed to draw more definitive conclusions about the science of speed eating. Nevertheless, the fluoroscopic findings in our speed eater were so dramatic that we suspect our observations in this case can be applied to competitive speed eaters in general. Rapid emptying of large unground pieces of hot dog into the small bowel also would likely have precipitated a dumping syndrome [5], which did not occur during our speed-eating test and which also has not been described by other competitive speed eaters during these contests.

Another important question is how speed eaters are able to alter their gastric physiology so their stomachs can become huge, flaccid sacs. Discussions with our speed-eating champion revealed that he spent several years training for the sport, forcing himself to consume larger and larger amounts of food despite the sensation of fullness and satiety to develop his speed-eating capabilities. In effect, he was slowly able to overcome the usual checks and balances associated with eating by exercising extraordinary will power and self-discipline during his training, consuming more and more food when others wouldn’t be able to swallow another bite without feeling sick (as our control subject did). Only as a result of this prolonged and intensive training process was the speed eater gradually able to adapt his stomach until it could withstand the rigors and stresses of competitive speed eating. In that sense, a world-class speed eater requires the same level of will power, self-discipline, and commitment as any professional athletes honing their skills in gymnastics, track, or other athletic endeavors. Whether such speed-eating individuals possess intrinsic eating abilities before beginning their training is unclear. Although some speed eaters may have stomachs that are inherently compliant, the only way to confirm this hypothesis would be to perform baseline barium studies on a group of speed eaters before they trained for competition in comparison with a group of control subjects.

**Consequences**

Based on our observations, the key to success in competitive speed eating is the ability to slowly train and adapt the stomach so that it can expand and dilate to a remarkable degree, enabling the speed eater to consume an extraordinary volume of food in an extremely short time (possibly superimposed on an innately compliant stomach). In that sense, a top competitive speed eater may be compared with a predatory carnivore that periodically gorges itself on its kills, ingesting massive amounts of food for sustenance until it captures another prey days or even weeks later. The trade-off is that the speed eater no longer experiences the sensation of fullness and satiety that normally occurs at the end of a meal. In effect, the speed eater’s stomach becomes so compliant and distensible that he or she never feels sated. When questioned on this subject, the competitive speed eater indicated unequivocally that his participation in the sport left him incapable of experiencing the usual sensation of fullness and satiety after meals.

Yet our speed eater looked trim and fit without an ounce of spare fat on him. How did he avoid becoming overweight under these circumstances? By carefully monitoring his oral intake, he told us, and by taking measured portions of food at mealtime without refilling his plate despite the fact that he never felt full or sated. He therefore exercised extraordinary self-discipline and willpower to avoid becoming overweight in a setting ripe for gaining weight.
Competitive Speed Eating

Fig. 2—Appearance of stomach in 35-year-old male world-class competitive speed eater on double-contrast barium study during rapid ingestion of 36 hot dogs for speed-eating test.

A, Preliminary frontal spot image of stomach shows mild gastric distention. Although some barium has emptied into duodenum, gastric peristalsis was noticeably decreased at fluoroscopy.

B, Repeat frontal spot image during early portion of speed-eating test shows moderate gastric distention and hot dog pieces (white arrows) in stomach. Also note food in distal esophagus (black arrows). No gastric peristalsis was observed at fluoroscopy.

C, Frontal spot image at 6 minutes shows innumerable retained hot dog pieces in dilated, flaccid stomach and absent gastric peristalsis at fluoroscopy.

D, Final frontal spot image of stomach at 10 minutes (after competitive speed eater had ingested 36 hot dogs) shows stomach as massively distended, food-filled sac occupying most of upper abdomen. Despite absence of gastric peristalsis, note emptying of barium into nondilated duodenum (arrows).
But the competitive speed eater was a young man. What will happen over the next 20 years, as he enters middle age and perhaps begins to lose the self-motivation critical for avoiding weight gain? It is easy to envision a scenario in which aging speed eaters lose their willpower and engage in chronic binge eating because they never feel sated. In this setting, long-time speed eaters and former speed eaters may be at substantial risk of developing morbid obesity and all the health risks associated with this condition.

Even more worrisome is the potential risk that a chronically dilated, flaccid stomach may eventually decompensate, so that it becomes an enormous sac incapable of shrinking to its original size and incapable of peristalsing or emptying solid food. If this happens, long-term competitive speed eaters ultimately could develop intractable nausea and vomiting, necessitating a partial or total gastrectomy to relieve their symptoms and restore their ability to eat. Thus, speed eating is a potentially self-destructive form of behavior that over time could lead to morbid obesity, intractable nausea and vomiting, and even the need for gastric surgery. For all these reasons, we believe the IFOCE should make it a high priority to follow up their athletes and former athletes to fully assess the long-term risks of competitive speed eating for its participants.

References