and 120 participants (89%) reported a variety of gastrointestinal symptoms, including epigastric pain. Persons with active infection were no more likely to report epigastric pain (75 [78%] of 97) than persons without infections (30 [79%] of 38). One participant reported gastric cancer and was *H. pylori*–positive. Seven participants reported a family history of gastric cancer; all were *H. pylori*–positive. Five participants, of whom 3 were *H. pylori*–positive, reported a history of gastric surgery for peptic ulcer disease. More rural participants (23 of 27) reported a history of ruptured ulcers or a family member with gastric cancer than did urban participants (74 of 108). The frequency of reported gastrointestinal symptoms was similar between urban and rural participants.

To our knowledge, this is the first survey of *H. pylori* infection in Georgia. We found a high rate of infection with *H. pylori*. Participants also reported a very high rate of dyspeptic symptoms, although these were not correlated with infection. This small convenience sample survey has several limitations, however. First, our participants did not constitute a systematically selected population sample. Second, rural populations were underrepresented. Finally, we used neighborhood or village of residence as a marker for socioeconomic status without specific income information from the participants. Therefore, socioeconomic status misclassification possibly occurred and the association between infection and socioeconomic status may not be accurate.

Nevertheless, it is unlikely that we substantially over- or underrepresented infection prevalence in the general population. Despite the limitations of this study, our results clearly indicate that *H. pylori* is a serious public health problem in Georgia. There is a pressing need to educate medical professionals and the general public about *H. pylori* infection and gastrointestinal illness and to introduce diagnosis of this infection and appropriate treatment for it into standard medical practice. In addition, rigorous population surveys that include children are needed to identify high-risk groups of persons for targeted public health interventions (7).

Acknowledgments

We thank John Heinrich for facilitating the use of an accurate point-of-care test of active *H. pylori* infection in the field. We also thank Maiko Chokheli, Ekaterina Jhorjholiani, and Tamuna Zardiashvili for assistance with data collecting.

This study was supported by a grant from the Biotechnology Engagement Program (BTEP) #13, Department of Health and Human Services. Dr. Gold is supported in part by a grant from the National Institutes of Health, NIDDK (DK-53708).

Katrina Kretsinger,* Jeremy Sobel,*
Nato Tarkhashvili,†
Neli Chakvetadze,†
Marina Moistrafishvili,†
Merab Sikharulidze,†
Ben D. Gold,*‡
Marina Chubinidze,†
and Paata Imnadze†

*Centers for Disease Control and Prevention, Atlanta, Georgia, USA; †National Center for Disease Control, Tbilisi, Republic of Georgia; and ‡Emory University School of Medicine, Atlanta, Georgia, USA

References

1. Suerbaum S, Michetti P. *Helicobacter pylori* infections. N Engl J Med. 2002; 347:1175–86.
2. Frenck R, Clemens J. *Helicobacter* in the developing world. Microbes Infect. 2003;5:705–13.
3. Brown LM. *Helicobacter pylori*: epidemiology and routes of transmission. Epidemiol Rev. 2000;22:283–97.
4. Skarbinski J, Walker HK, Baker LC, Kobaladze A, Kirtava Z, Raffin TA. The burden of out-of-pocket payments for health care in Tbilisi, Republic of Georgia. JAMA. 2002;287:1043–9.
5. United Nations Development Programme. Human Development Report Georgia, 2000. [cited 2004 Feb 22]. Available from http://www.undp.org.ge/nhdr2000/NHDR-GEO2000.pdf
6. Gatta L, Ricci C, Tampieri A, Vaira D. Non-invasive techniques for the diagnosis of *Helicobacter pylori* infection. Clin Microbiol Infect. 2003;9:489–96.
7. Gold BD. *Helicobacter pylori* infection in children. Curr Probl Pediatr Adolesc Health Care. 2001;31:247–66.

Address for correspondence: Jeremy Sobel, Centers for Disease Control and Prevention, 1600 Clifton Rd, Mailstop A38, Atlanta, GA 30333, USA; fax: 404-639-2205; email: jsobel@ cdc.gov

Botulism and Preserved Green Olives

To the Editor: In March 2004, a total of 16 suspected cases of botulism were reported to the Italian National Institute of Health by hospitals in 3 adjoining regions in central and southern Italy (Molise, Campania, and Puglia). Initial investigation showed that all patients had eaten at the same restaurant in Molise on February 22 or 24, 2004. The restaurant provided reservation lists for those dates (the restaurant was closed on February 23). It also provided a list of foods that had been served each evening. Persons on the reservation lists were contacted and asked to provide the names of others who had been at their tables to ensure that as many diners as possible were traced. Of 73 persons who had been identified as having eaten at the restaurant on either evening, 66 were successfully contacted and interviewed in person or by telephone about symptoms and food consumed at the restaurant.

For purposes of the investigation, a probable case-patient was defined as a person who had dined at the restaurant on February 22 or 24 and had experi-

enced diplopia or blurred vision and at least 1 of the following symptoms: dysphagia, dry mouth, dysarthria, upper/lower extremity weakness, dyspnea, and severe constipation. Those who met the probable case definition and had laboratory-confirmed botulism were considered definite case-patients.

We tested for botulinum neurotoxin in serum and spores in stool samples as described (1). Serum or stool specimens from 24 patients with ≥2 symptoms were sent to the Italian National Institute of Health for testing.

Twenty-eight persons reported ≥2 symptoms (42% attack rate); 25 (89%) were considered probable cases and 3 (11%) were considered confirmed cases. Two members of the restaurant owner's family and 1 employee were among the probable case-patients. Onset of symptoms occurred 4 hours to 6.5 days after eating at the restaurant (median 36 hours). Twenty persons (71%) had been seen in emergency rooms, 15 (53%) were admitted to a hospital, and 18% were admitted to intensive care. None required ventilatory support, and no deaths occurred.

The main symptoms reported by 28 probable and confirmed patients included dry mouth in 25 (89%), dysphagia in 25 (89%), severe constipation in 22 (79%), and blurred vision in 27 (96%). Three weeks after onset of symptoms, 15 (68%) reporting severe constipation, 11 (41%) reporting blurred vision, 10 (40%) reporting dry mouth, and 11 (44%) reporting dysphagia still had these symptoms. Of the 24 patients for whom rectal swabs were available, 3 were culture-positive for *Clostridium botulinum* type B. None of 5 serum samples tested positive.

Food-specific attack rates, relative risks (RRs), and 95% confidence intervals (CIs) were calculated. A Poisson model with robust error variance was used to estimate RR with adjustments for possible confounding and effect modification (2). Foods associated with illness with p values <0.20 were considered in the model.

In a univariate analysis in which all 28 patients were considered, the RR of illness was higher among diners who ate home-preserved green olives in salt water (RR 5.2, 95% CI 1.4–19.8), ate cream pastries (RR 2.5, 95% CI 1.8–3.4), and drank homemade lemon liqueur (RR 2.1, 95% CI 1.3–3.4). After multivariate analysis, only the risk associated with eating green olives remained significant (RR 5.2, 95% CI 1.4–19.8).

None of the food items served on February 22 or 24 was available for sampling, and none of the other 13 food samples obtained from the restaurant was positive for *C. botulinum*. However, the pH of a jar of olives that had been prepared at the same time as those eaten on February 22 and 24 was 6.2, far above the level of 4.6 required to prevent growth of *C. botulinum*. No salinity testing was performed by the local laboratory, and inadequate storage during transit made it impossible to conduct salinity and water activity tests at the national reference laboratory.

Interviews with the restaurant proprietors indicated that the olives were prepared on site during the fall of 2003 from local olives. After soaking in salt water for 35 days, the olives had been decanted into jars, and salt water had been replaced with fresh water. Neither the amount of salt used in the salt water mixture nor the pH at any stage was standardized during preparation.

Both epidemiologic evidence and information obtained regarding preparation of the olives strongly suggest that they were the likely source of the outbreak. This outbreak highlights the previously documented risk associated with improperly prepared olives (3–5). In Italy and elsewhere in Europe, an increasing trend favors traditional foods and preparation methods over large-scale industrial products. This outbreak underlines the importance of providing training and periodic monitoring of those involved in small-scale preparation to ensure that disease risks from improperly prepared or stored foods are minimized.

Acknowledgments

We thank the staff of the local health unit and Carabinieri force for their logistic support of the field investigation, Primula Semprini for providing laboratory results for food samples, Alain Moren for scientific support and advice, and Nancy Binkin for her assistance in reviewing the manuscript.

Amy Cawthorne,*
Lucia Pastore Celentano,*†
Fortunato D'Ancona,†
Antonino Bella,† Marco Massari,†
Fabrizio Anniballi,† Lucia Fenicia,†
Paolo Aureli,†
and Stefania Salmaso†

*European Programme for Intervention Epidemiology Training, Rome, Italy; and †Istituto Superiore di Sanità, Rome, Italy

References

1. Food and Drug Administration. Bacteriological analytical manual online. January 2001 [cited 2005 Feb 10]. Available from http://www.cfsan.fda.gov/~ebam/bam-mm.html
2. Zou G. A modified poisson regression approach to prospective studies with binary data. Am J Epidemiol. 2004;159:702–6.
3. Fenicia L, Ferrini AM, Aureli P. Epidemia di botulismo da olive nere. Industrie Alimentari. 1992;31:307–8.
4. Padua L, Aprile I, Lo Monaco M, Fenicia L, Anniballi F, Pauri F et al. Neurophysiological assessment in the diagnosis of botulism: usefulness of the single-fiber EMG. Muscle Nerve. 1999;22:1388–92.
5. Endoh M, Okuno R, Shimojima Y, Murata I, Sekine H, Kokubo Y. Botulism, Japan. Infectious agents surveillance report. [cited 2005 Feb 10]. 2000; 21:54.Available from http://idsc.nih.go.jp/iasr/21/241/tpc241.html

Address for correspondence: Amy Cawthorne, European Programme for Intervention Epidemiology Training, Centro Nazionale di Epidemiologia Sorveglianza e Promozione della Salute, Reparto di Epidemiologia delle Malattie Infettive, Istituto Superiore di Sanità, Viale Regina Elena 299, 00161 Rome, Italy; fax: 39-06-4423-2444; email: cawthorn@iss.it