

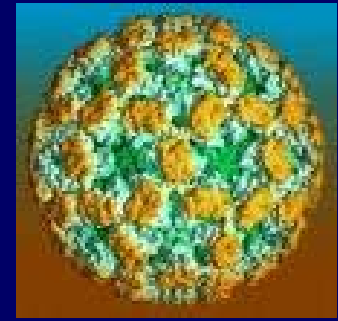
The Unwelcome Guest: Oyster Related Norovirus Outbreaks November-December 2009

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Norovirus Facts



- Small, round-structured viruses from *Caliciviridae* family
- First recognized as pathogenic cause of gastroenteritis in 1968, Norwalk, Ohio
- Transmitted via fecal-oral route
- Highly contagious—as few as 10 viral particles can cause infection

SC Outbreaks

- On November 30, SC Department of Health and Environmental Control (SC DHEC) started investigating an enteric outbreak related to a private oyster roast party in Charleston, held on Friday, November 27.
- 10/17 developed GI Illness
- Incubation – 24-35 hrs. Duration – 12-24 hrs.
- Limited Food histories – 5 ill persons consumed oysters and 6 non-ill did not consume oysters
- 3 seafood market food handlers were ill one day prior to the sale of oysters. 2/3 had consumed raw oysters the previous day and the other had handled raw oysters.

SC Outbreaks

- One seafood handler tested positive for Norovirus GII
- One oyster roast party attendee also positive for Norovirus GII
- Most of the oysters were purchased from San Antonio Bay, Texas. Some were purchased locally from Beaufort, SC.
- Oysters were steamed to varying level of “doneness”.

SC Outbreaks

- On Nov 30, 2009, DHEC also started investigating a complaint about GI illnesses related to oyster consumption at a restaurant in Hilton Head, SC.
- 3/6 ate oysters on Nov 27 and were ill on Nov 28 with GI illness.
- The non-ill did not report oyster consumption.
- 2 of the ill persons were NC residents and subsequent investigation and testing of these residents confirmed they were ill with Norovirus GII
- The oysters consumed by this group were also from San Antonio Bay, Texas.

December 2009

- 280 people ill with nausea/vomiting/diarrhea
December, 2009 following dining at oyster bar
in Raleigh, North Carolina
- Environmental assessment and epidemiologic
investigation
- Coordination between 6 county, state and federal
public health agencies plus university
researchers

It's an Oyster Bar.....



Laboratory Testing

- 3 of 5 patron stool samples tested RT-PCR positive for norovirus at NC SLPH
- 0 of 8 foodhandler specimens tested positive for norovirus
- Subsequent sequence analysis by CDC CaliciNet showed all positive samples were G II.12 norovirus strains

Epidemiologic Investigation

- Case – control study
- 51 cases - Random sample from 177 illness complaints to county officials
- 80 well controls (meal companions and restaurant credit card receipt customers)
- All dined at oyster bar December 10-22, 2009

Epi Results

Exposure	Odds Ratio	Confidence Intervals	<i>P</i> value
Any oysters	12.98	4.27-39.45	.00001
Raw oysters	1.18	.25-5.53	.55
Steamed oysters	11.56	4.85-27.53	.0000001

* Additionally Cocktail sauce, Horseradish sauce, hot sauce, butter sauce, cole slaw and hushpuppies; all were eliminated in stratified analyses.

Steamed Oysters

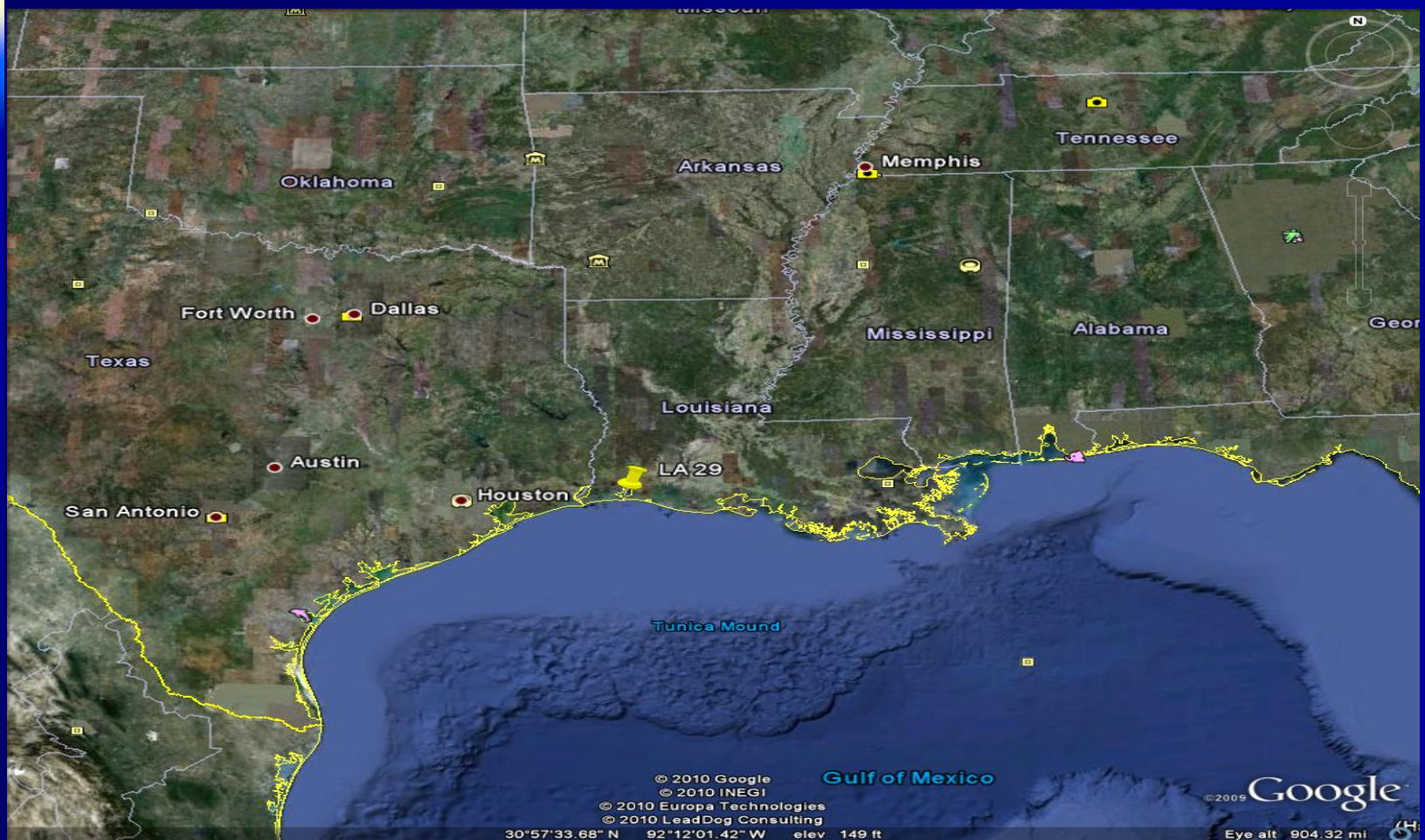
- Could order them steamed 2 minutes, 4 minutes or 6 minutes
- Measured cook temperatures ranged 69-166 degrees F



Which Oysters?

- 4 states (Texas, Louisiana, Mississippi, North Carolina)
- 8 separate sites
 - Texas (2 sites)
 - Louisiana (4 sites)
 - Mississippi & North Carolina (1 each)

Source Growing Area LA 29



Issues & Uncertainties

- By the time the Epi Study concluded, no LA 29 oysters remained to test
- Norovirus G II.12 was same strain as November's San Antonio Bay outbreak
- Variety of control measures were introduced, uncertain results

Conclusion & Future Needs

- Should not assume all norovirus transmission is person-to-person; more studies are needed
- Development and wide distribution of technology to test for norovirus in/on food
- Oysters are treated differently than all other commodities, introducing delays and barriers during foodborne illness investigations