


**Biology 675**

CASE-CONTROL STUDIES  
Foodborne Disease



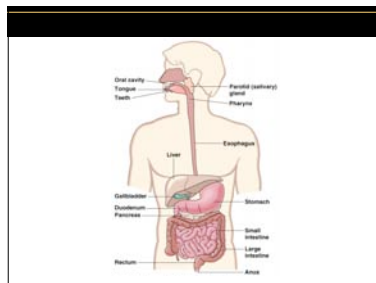
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**Foodborne Diseases**

- Transmitted in
- Fecal-oral cycle can be broken by:

**Foodborne Diseases**

- Type of transmission:



**Foodborne Diseases**

- \_\_\_ million cases of diarrheal diseases/year (U.S.)
- \_\_\_ deaths/yr (U.S.)
- Sequelae
- Preventable



**Foodborne Illness**

## Food Poisoning

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### California Raw Milk Quarantine Lifted at Dairy Linked to *Campylobacter*

May 18, 2012 by Kelly Hill • 2 Comments

California has lifted a statewide quarantine on raw milk products produced by Organic Pastures of Fresno County more than a week after it was revealed for *Campylobacter* contamination.



Recent Posts

New Louise Braghter Reveals Results of Her Analytical Survey: Report of Confirmed and Suspected Salmonella Food Products

Debating Artificial Sweeteners May Not Be the Answer

Cleaning Your Dish Towel? Wash, Don't Wipe It Out

Food: Pigeons Perched for Unpleasant Fate

Our Editor

**Contributing Factors**

**Potential contamination of produce**

- In the field
- Processing
- Distribution
- Preparation

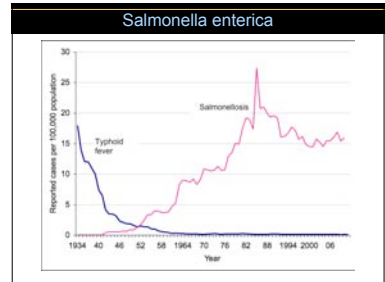
### Enteric Host Defenses

- Mucous membranes
- HCI
- Paneth cells
  - Phagocytes
  - Defensins
- Normal microbiota

### Changing Patterns of Foodborne Illness

Newly identified pathogens, routes, & vehicles

Old Outbreak Scenario      New Outbreak Scenario

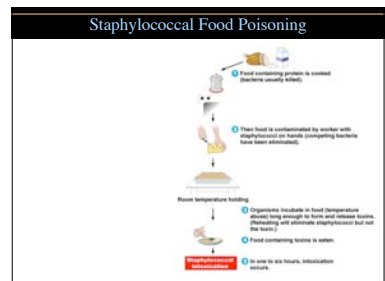
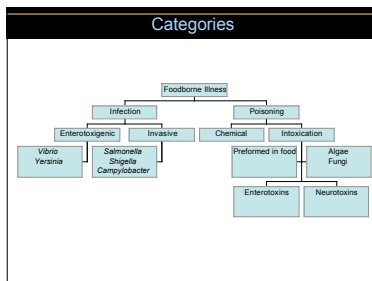
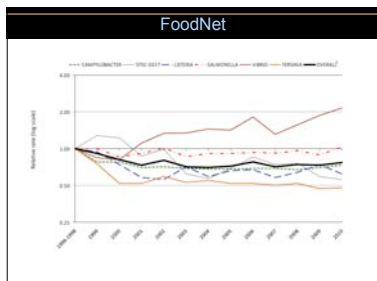
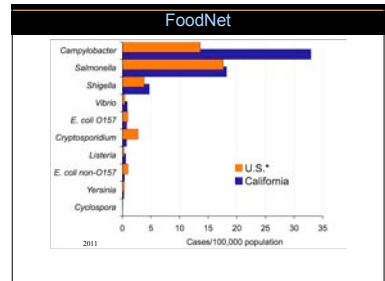


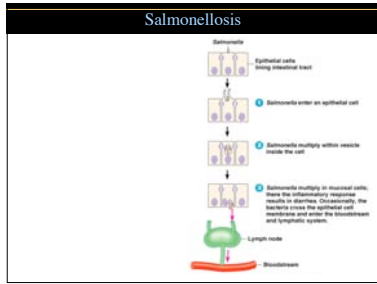
### Emergence of Foodborne Diseases

- Globalization
- Mass production
- Changes in consumer behavior.
- Changes in consumer susceptibility to foodborne disease.
- New detection & identification methods & studies.

### <http://www.cdc.gov/foodnet/>

- Component of Emerging Infections Program
- CDC, USDA, FDA
- Determine & monitor the burden of foodborne disease
- Determine proportion of disease attributable to specific food
- Develop network to respond to new/emerging foodborne disease





### Viruses

- Rotavirus
- Norovirus
- Treatment:

A microscopic image showing numerous rotavirus particles, which are spherical with a characteristic wheel-like appearance.

### Mycotoxins

- Mycotoxins are produced by some fungi:
  - *Claviceps purpurea*
    - ; causes hallucination
  - *Aspergillus flavus*

A photograph of a petri dish containing a petri dish with fungal growth. Labels indicate 'Aerial hyphae' and 'Vegetative hyphae'.

### Planktonic Algae

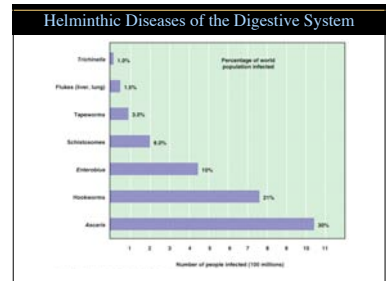
Dinoflagellates

Diatoms

Microscopic images showing various types of planktonic algae, including dinoflagellates and diatoms.

### Cryptosporidiosis

A microscopic image showing several Cryptosporidium oocysts, which are spherical and have a thick, multi-layered wall.



### Find the source

- This outbreak occurred at one of the cafeterias located in the out patient department which serves approximately 600 visitors and employees daily. We will call this cafeteria "cafeteria A." This is a 940 bed hospital with 4 cafeterias and a few restaurants.
- On December 9 individuals who had eaten at cafeteria A reported nausea and projectile vomiting after eating a noon meal.

### Step 1

- Case Definition
- A case was defined as any person who ate lunch prepared at cafeteria A on December 9 and developed sudden onset of vomiting or diarrhea, or abdominal cramps and any of the following symptoms including nausea, fever, body aches, headache, chills or fatigue.
- Now what?

### Step 2

- Now what?

**Step 3**

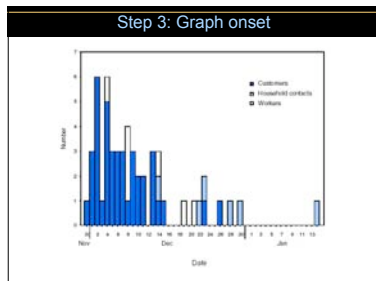
- What's next?

**Step 3: Phone Interview**

- Demographic: Name, address, occupation, gender, age
- Illness: Symptoms, onset, duration, lab tests
- Exposure: 72-hr food history  
What, where, with whom
- Use a standard form

**Step 3: Summarize data**

- N = 75 with 40 ill and 35 non-ill individuals
- Mean age = 39 years. Range = 25-56 years
- 85% of the study population was female
- Incubation period = 15 minutes to 19 hours
- Mean = 4 hours. Excluding the one outlier, the incubation period was:
  - Between 15 min to 8 hr. Short duration



**Step 3**

Predominant symptoms

- nausea (93%) and vomiting 78%
- abdominal cramps (68%)
- fatigue and diarrhea (63%)
- headache (48%)
- chills (43%)
- body aches (25%)
- fever (18%)

**Step 4: Lab work**

- All patient (ill) and employee nares and stool cultures or rectal swabs were negative for *Staphylococcus aureus* and *Bacillus cereus*.

**Step 5**

- The duration of illness ranged between less than 24 hours to 72 hours. Mean being 24 hours. 62.5% of the ill were bedridden, 27.5% sought medical care and 2.5% were hospitalized.

**Relative Risk**

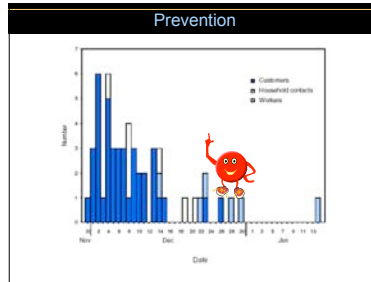
	Ill	Not ill	
Exposed to_			(e) =
Not exposed			(f) =
Relative risk = times more likely to become ill =			

**Relative Risk**

	Ill	Not ill	
Green beans			(e) =
Not exposed			(f) =
Relative risk =			

**Preparation of Green Beans**

- The frozen green beans were steamed for 10 minutes, then seasoned with salt, pepper, olive oil and garlic mix.
- Then baked for 15 minutes at 375°F
- Stored in a warmer at 180°F placed in a pan
- Sent to the serving line (140°F), where they were served rather quickly, as most of the lunch items had a side order of green beans



**Practice Problems**

- On BIOL 675 website