ASSESSMENT OF MICROBIOLOGICAL RISKS FROM FOOD

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Topics
- Hazards from food
- Food safety in China
- Principles of risk assessment (microbiology)
- Risk assessment → risk analysis → food safety

Hazards from food
- Microbiological: infections, intoxications
- Other: intoxications, allergies, intolerances, idiopathic illnesses
- Bioterrorism? (infections, microbial & nonmicrobial intoxications)

Microbiological hazards
- Infections: live agent in food when eaten
- Intoxications: preformed microbial poison in food when eaten

Foodborne illness, China

<table>
<thead>
<tr>
<th>Year</th>
<th>Outbreaks</th>
<th>Illnesses</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>624</td>
<td>20,124</td>
<td>143</td>
</tr>
<tr>
<td>2002</td>
<td>464</td>
<td>11,572</td>
<td>68</td>
</tr>
<tr>
<td>2003</td>
<td>1481</td>
<td>29,600</td>
<td>262</td>
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<tr>
<td>2004</td>
<td>2305</td>
<td>42,876</td>
<td>255</td>
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</tbody>
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Microbial contamination caused more foodborne illness in China than agricultural chemical contamination in 2005
Foodborne disease in China
- 2d quarter 2006: 5696 cases; 1950 in schools
- Safety of school food?
- China Daily: official data, ann. avg. ~300 million/yr

Schools in Sichuan, September 2006
- Chongzhou 1º: 300/1100 students (Shigella)
- Chengdu 1º: ~90 ill (same-day onset?)
- Chengdu teachers now eat 30 minutes before students.

Risk assessment to predict:
- Probability, severity
- Disease agent, vehicles, “at-risk” population
- Exposure assessment: frequency & levels of ingestion via food

Pathogens in food (1)
- Sources: humans (food handlers?), animals, environment
- Bacteria & fungi may multiply in food: viruses (Shanghai clams, 1988, 300k ill) & parasites cannot

Pathogens in food (2)
- Persistence: freezing, refrigeration, processing, preparation
- Hazard characterization: dose vs. severity

Risk characterization parameters:
- Prevalence (time & place of occurrence)
- Severity (bias)
- Susceptibility of hosts
- Social (& economic?) impact
Information for risk assessment:
- World’s scientific literature
- Incidence of present illness in targeted population
- Update as new information becomes available

Records needed for risk assessment
- Illnesses & etiologies (diagnosis, field work, lab analyses)
- Vehicles (sampling, testing, traceback)
- Preventive measures in place (resources)

The zero-risk goal
- Cost of incremental improvement
- The not-eating option
- Cost “no object” — food elitism

Risk management by HACCP:
- Prevent contamination
- Undo contamination by processing (CCP)
- Last resort: test

System design for risk analysis and safety
- Responsibility shared by government, industry, consumers
- Assessment, management, communication
- Costs, public perceptions

Applying risk analysis:
- Risk assessment — greater accuracy (> data collection & sharing)
- Risk management — government leadership, industry execution
- Risk communication — government, industry, public