Investigation of Q fever in Bosnia-Herzegovina, 2000: An Example of International Cooperation

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Q fever

- *Coxiella burnetii*

- Zoonosis, contact with livestock (sheep, cattle, goats)

- Resistant to environmental extremes; wind-borne spread

- Worldwide distribution; previously considered common in Eastern Europe (“Balkan fever”)
Introduction

- In June 2000, increase in Q fever cases in FBiH
  - Mostar, Kakanj
  - No diagnostic testing for humans available

- Objectives:
  - Develop laboratory capabilities within FBiH to diagnose Q fever in humans and animals.
  - To assess the occurrence of and risk factors for Q fever among humans.
  - To develop public health recommendations to control disease transmission.
Laboratory Diagnostics

• IFA, species-specific conjugate

• Specimens screened 1:16, IgG

• Human sera
  - Phase II antibody (acute)
  - Phase I antibody (chronic)
  - Geometric Mean Titers (GMT)
Epidemiologic Assessment

• Tested human and animal specimens from all over FBiH

• Mostar – descriptive epidemiology of cases

• Kakanj – descriptive epi and case-control study
## Results – Animal Diagnostic Specimens by Species

<table>
<thead>
<tr>
<th>Species</th>
<th>$n$</th>
<th>No. positive</th>
<th>% Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep</td>
<td>536</td>
<td>23</td>
<td>4%</td>
</tr>
<tr>
<td>Cattle</td>
<td>815</td>
<td>84</td>
<td>10%</td>
</tr>
<tr>
<td>Goats</td>
<td>39</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

Preliminary results; specimens from all over FBiH. Specimens screened for Phase I antibody at 1:16.
# Results – Human Diagnostic Specimens by Town

<table>
<thead>
<tr>
<th>Town</th>
<th>n</th>
<th>Phase I Positive (%)</th>
<th>Phase I GMT</th>
<th>Phase II Positive (%)</th>
<th>Phase II GMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mostar</td>
<td>219</td>
<td>120 (55%)</td>
<td>100</td>
<td>127 (58%)</td>
<td>85</td>
</tr>
<tr>
<td>Bogodol</td>
<td>30</td>
<td>23 (77%)</td>
<td>46</td>
<td>22 (73%)</td>
<td>66</td>
</tr>
<tr>
<td>Goranci</td>
<td>55</td>
<td>30 (55%)</td>
<td>140</td>
<td>30 (55%)</td>
<td>161</td>
</tr>
<tr>
<td><strong>Kakanj</strong></td>
<td><strong>151</strong></td>
<td><strong>42 (28%)</strong></td>
<td><strong>667</strong></td>
<td><strong>54 (36%)</strong></td>
<td><strong>733</strong></td>
</tr>
<tr>
<td>Bihac</td>
<td>15</td>
<td>6 (40%)</td>
<td>256</td>
<td>7 (47%)</td>
<td>232</td>
</tr>
<tr>
<td>Kalesia</td>
<td>22</td>
<td>3 (14%)</td>
<td>81</td>
<td>3 (14%)</td>
<td>406</td>
</tr>
<tr>
<td>Konjic</td>
<td>12</td>
<td>11 (92%)</td>
<td>451</td>
<td>11 (92%)</td>
<td>796</td>
</tr>
<tr>
<td>Sarajevo</td>
<td>12</td>
<td>4 (33%)</td>
<td>64</td>
<td>5 (42%)</td>
<td>256</td>
</tr>
<tr>
<td>Tesanj</td>
<td>23</td>
<td>2 (9%)</td>
<td>23</td>
<td>2 (9%)</td>
<td>45</td>
</tr>
<tr>
<td>Travnik</td>
<td>13</td>
<td>5 (38%)</td>
<td>84</td>
<td>6 (46%)</td>
<td>102</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>749</strong></td>
<td><strong>272 (36%)</strong></td>
<td><strong>134</strong></td>
<td><strong>299 (40%)</strong></td>
<td><strong>153</strong></td>
</tr>
</tbody>
</table>
Mostar Results

• Case: Illness (fever plus other symptoms) since 1/1/00; Phase II titer >= 128, and Phase II >=I;
  - $n = 7$
  - Phase I GMT: 105
  - Phase II GMT: 256
Kakanj Results

• Case: Illness (fever plus other symptoms) since 1/1/00, Phase II titer $\geq 128$, and Phase II $\geq 1$;
  - $n = 23$
  - Phase I GMT: 1264
  - Phase II GMT: 3631

• Control: No illness since 1/1/00, Phase II and I antibody titer $< 16$;
  - $n = 22$
## Kakanj Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. Cases</th>
<th>No. Controls</th>
<th>Odds Ratio (95% Confidence Interval)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handle Sheep (23/22)</td>
<td>1</td>
<td>5</td>
<td>0.15 (0.01-1.65)</td>
<td>0.10*</td>
</tr>
<tr>
<td>Handle Cattle (23/22)</td>
<td>2</td>
<td>7</td>
<td>0.20 (0.02-1.35)</td>
<td>0.07*</td>
</tr>
<tr>
<td>Milk from neighbor (17/19)</td>
<td>11</td>
<td>5</td>
<td>5.13 (1.01-28.25)</td>
<td>0.02</td>
</tr>
<tr>
<td>Outdoor activities (23/21)</td>
<td>18</td>
<td>12</td>
<td>2.7 (0.61-12.44)</td>
<td>0.13</td>
</tr>
</tbody>
</table>
Conclusions

• Evidence of widespread Q fever in FBiH

• Evidence of acute Q fever outbreak in Kakanj
  - not associated with direct livestock exposure
  - hypotheses: possible wind-borne spread or contaminated milk products

• Could not confirm an outbreak of Q fever in Mostar
  - few cases, low GMT
  - overall GMT in Mostar more consistent with endemic disease than acute infection
Recommendations

• Effective control will require long-term cooperation between veterinary and medical communities.

• To prevent future outbreaks, public education will be important.
  - consume only boiled or pasteurized milk products.
  - avoid contact with birthing materials
  - encourage better farm management practices to minimize local infections and wind-borne spread
Accomplishments

• Provided veterinary and medical staff in FBiH with laboratory supplies and expertise to conduct *C. burnetii* IFA.

• Encouraged greater cooperation between medical and veterinary communities within FBiH.

• Facilitated the first meeting between veterinary officials from FBiH and the Republic Srpska since before the civil conflict.
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