Outbreak of staphylococcal food poisoning among children and staff at a Swiss boarding school due to soft cheese made from raw milk

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Background
On October 1, 2014, children and staff members at a Swiss boarding school consumed Tomme, a soft cheese produced from raw milk. Within 7 h, all 14 persons who had consumed the cheese fell ill, among them 10 children and 4 members of the staff. Based on the short incubation time, as well as the clinical symptoms, SFP due to consumption of the raw milk cheese was considered a possible cause of the outbreak.

Objective
We aim to present a food poisoning outbreak and to characterize its causative agent.

Bacterial isolation & enumeration
Rabbit plasma fibrinogen agar was used for enumeration of coagulase-positive staphylococci (CPS). In total, the cheese contained 10⁷ CFU CPS/g. Interestingly, three different S. aureus strains (SA_1, SA_2, and SA_3) were present at levels > 10⁶ CFU/g.

Enterotoxin detection
- SET2 mini Vidas was used to screen the cheese for SEA-SEE.
  - => SEA+ and SED+
- We determined by SET-RPLA that the cheese contained:
  - > 6 ng of SEA/ g
  - > 200 ng of SED/ g

Outbreak data
- S. aureus was isolated using rabbit plasma fibrinogen (RPF) agar, following EN ISO 6888-2 protocol.
- Source: Tomme raw milk cheese
- 14 patients (10 children, 4 adults)
- Symptoms: abdominal pain, emesis, (bloody) diarrhea, fever
  - Incubation time: 2.5 h (children <10y) 3.5 h (children ≥10y) 7 h (adults)

Microarray-based genotyping
All three S. aureus strains isolated from the Tomme cheese were characterized by DNA microarray analysis.

<table>
<thead>
<tr>
<th></th>
<th>major SE genes</th>
<th>newly described SE genes</th>
<th>spa type</th>
<th>agr type</th>
<th>clonal complex</th>
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<td>CC705</td>
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<td>t458</td>
<td>III</td>
<td>CC20</td>
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</tbody>
</table>

We identified S. aureus SA_1 as the source of the outbreak.

SA_1 exhibited characteristics of a genotype B strain. This genotype comprises bovine S. aureus strains exclusively associated with very high within-herd prevalence of mastitis and has been described as a major contaminant in Swiss raw milk. It is highly likely that the raw milk used for Tomme production was heavily contaminated with S. aureus.

Conclusions
1) The outbreak was caused by Tomme raw milk cheese contaminated with an S. aureus strain producing SEA and SED.
2) The outbreak was caused by a genotype B strain, a genotype exclusively linked to high within-herd prevalence of mastitis.
3) The incubation time depended on the age of the patient.

Details on this study are also available online: