



VTEC O104 OUTBREAK IN GERMANY

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The largest known outbreak of verocytotoxin-producing *Escherichia coli* (VTEC) infection in Europe occurred in Germany from May to June 2011. According to the WHO, a total of 908 cases of haemolytic uraemic syndrome (HUS) were reported along with 3,168 VTEC cases and a total of 50 deaths, [Table 1](#).

Table 1. HUS, VTEC cases & deaths reported to WHO as per 22.07.2011

	HUS cases	VTEC cases	Deaths
Germany	857	3078	48
Sweden	18	35	1
Denmark	10	16	0
France	7	10	0
Holland	4	7	0
Great Britain	3	4	0
USA	4	2	1
Austria	1	4	0
Switzerland	0	5	0
Canada	0	1	0
Czech Rep.	0	1	0
Greece	0	1	0
Luxemborg	1	1	0
Norway	0	1	0
Poland	2	1	0
Spain	1	1	0
Total	908	3168	50

In Germany, a preponderance of adult women was seen among HUS and VTEC cases. The source of the outbreak was initially assumed to be fresh tomatoes, cucumbers or salad, but subsequently fenugreek sprouts from a single German producer were confirmed as the source.

The fenugreek seeds had been imported from Egypt. In many cases, the sprouts had been used as decoration and in sandwiches, and consequently many patients were unaware that they had ingested the sprouts.

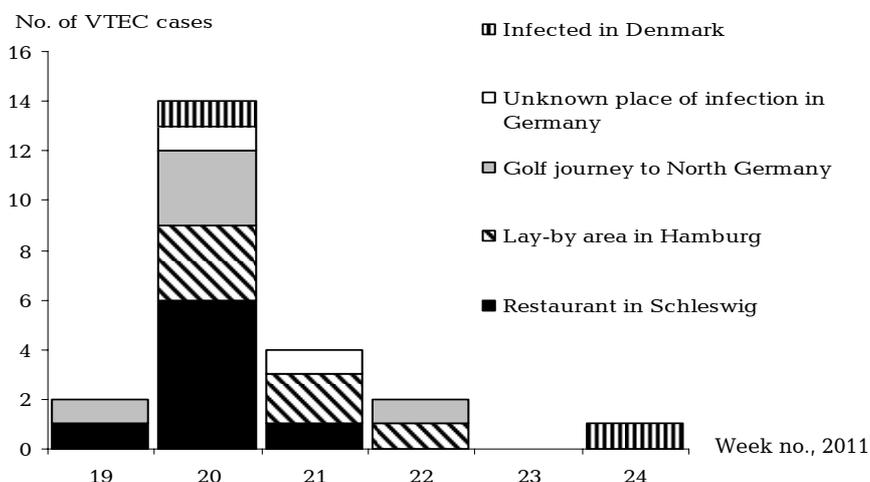
The outbreak was primarily limited to Northern Germany with travel-associated cases in 13 other European countries, including Denmark.

At the end of July, a minor local outbreak occurred in France. This outbreak was associated with the same fenugreek seeds, but unrelated to the German outbreak.

VTEC O104

The VTEC strain causing the outbreak, VTEC O104:H4, differs from other known strains in several ways. It contains virulence and antibiotics resistance genes which are not nor-

Figure 1. Weeks of disease onset and place of infection, Danish cases



mally seen in VTEC strains, and the Statens Serum Institut has, among others, helped demonstrate that the outbreak strain fundamentally belongs to the group of the so-called enteroaggregative *E. coli*.

It is possible that these new genetic properties have made the strain more virulent than other frequently occurring VTEC strains and this may have contributed to the serious course of the outbreak.

The Danish investigation

On 22 May the German authorities released a message via the EU warning network stating that they had observed an increased number of VTEC cases.

Statens Serum Institut and the Danish National Board of Health initiated an investigation with a view to quickly informing citizens and healthcare professionals of any VTEC infection. Furthermore, active tracking of VTEC cases was initiated to establish if an outbreak of Danish origin was also in play.

Every outbreak case was defined as 1) confirmed infection with VTEC O104, or 2) confirmed infection with VTEC which was vtx2-positive and eae-negative AND a visit to Germany in May or 3) clinical HUS AND a visit to Germany in May or 4) clinical HUS or bloody diarrhoea AND epidemiological contact to patients from one of the three first-mentioned categories.

In the period from 25 May to 15 July, a total of 26 Danish cases were reported; 13 women and 13 men aged 6-81 years.

Twenty cases were admitted and ten developed HUS. No deaths occurred among the Danish cases.

Interviews with the Danish VTEC cases showed that 23 were infected

in connection with visits to Germany and that the exposure was limited to a small number of locations, [Fig. 1](#). Eight of the Danish cases had visited the same restaurant in Schleswig during visits organised by five different companies.

For two of these companies, a cohort survey was conducted to identify a single food or meal as the cause of the disease. The investigation was unable to unambiguously show a common source of infection, but indicated that the incubation period of the outbreak strain was longer than usual for VTEC infection (8 days in contrast to the expected 2-4 days). Information about the Danish visits to Germany was given to the German authorities and used in reverse tracking of foods, including sprouts. The remaining three cases were infected in Denmark; two were secondary to other cases and, in the third case, a probable route of infection could not be established.

Commentary

Sprouts have previously been the source of food-borne outbreaks, but these outbreaks were less serious. The uncommonly serious outbreak reported here shows that food safety can be of pivotal importance to public health and it underpins the importance of constant surveillance of food-borne conditions and outbreak management.

The Danish contribution bears witness to a good and intensive cooperation between the clinical microbiology departments, the infectious disease departments, Medical Officers of Health and Statens Serum Institut.

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