An outbreak of Shiga toxin-producing *Escherichia coli O148* infection associated with mutton consumption. France, June 2002

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Background

- The 10th June 2002: notification of a cluster of two adult cases of Hemolytic Uremic Syndrome (HUS) by the Hospital of Libourne (Gironde)
- Common exposure: a wedding party on the 29th June 2002
- Cases of diarrhea among the guests

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Suspicion of an outbreak of shiga toxin-producing *Escherichia coli* (STEC) infection

Methods

Epidemiological investigation

- Retrospective cohort among the 82 wedding party guests
- Case definition: guest with diarrhea or at least two signs of acute gastrointestinal illness with onset in the 10 days following the wedding party
- Interview of 75 guests about foods and drinks consumed during the party

Investigations of foods

- Trace back of the origin of foods
- Microbiological examination of:
  – Leftover samples (cooked mutton and raw offal)
  – Samples of processed foods from the same batches as served at the party

Microbiological methods

- HUS cases tested for serum antibodies against 26 major serotypes of STEC
- Shigatoxin (*Stx*) and virulence traits by PCR on stools and food
- Culture for STEC of Stx positive samples
- Typing of isolates: phage typing and PFGE

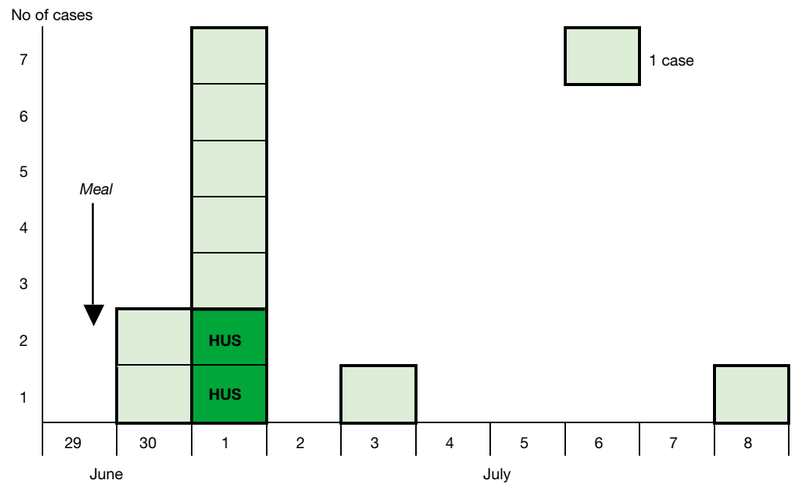
Results

- Eleven cases including 2 HUS: attack rate 13%
- 10 adults [from 25 to 65 years old] and 1 child

Table I: Symptoms of cases

Symptoms	N	(%)
Diarrhea	10	(91)
Hemorraghic diarrhea	4	(37)
Abdominal pain	8	(73)
Nausea	5	(45)
Vomiting	4	(37)

Figure 1: Onset of illness of cases



- No serum antibodies were detected in the 2 cases of HUS
- Two STEC strains were isolated:
  – an O26 strain (*stx1, eaeA, ehxA*) from a case with diarrhea
  – an O148 strain (*stx2c*) from a HUS case
- 82% of cases had eaten lightly roasted mutton and poultry pâté
- Only the consumption of pâté tended to be associated with illness (RR 3,8 ; 95%CI 0,9-16,4).

Table II: Attack rate (AR) and Relative risk (RR) (95%CI)

Food	Eaten AR	Not eaten AR	RR	95%CI
Poultry pâté	23%	6%	3,8	0,9-16,4
Smoked salmon toasts	20%	7%	2,8	0,6-12,2
Quiche	15%	6%	2,5	0,3-18,7
Lumpfish roe toasts	19%	10%	1,9	0,6-6,3
Taboulé	17%	13%	1,3	0,4-4,6
Cake	14%	13%	1,3	0,2-7,8
Fish pâté	17%	15%	1,1	0,4-3,3
Coulommiers (cheese)	15%	16%	1,0	0,3-2,9
Roasted mutton	15%	17%	0,9	0,2-3,7
Rice salad	13%	21%	0,6	0,2-1,9
White Beans	11%	28%	0,4	0,1-1,1
Pizza	9%	28%	0,3	0,1-1,0

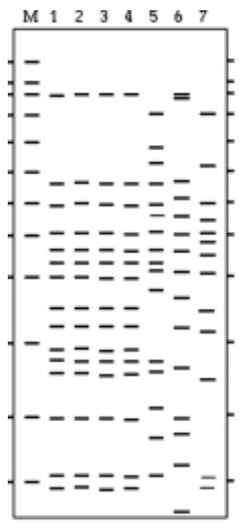
- Food was traced back to origin
  – mutton: sheep raised and slaughtered at the family farm
  – poultry pâté: industrial product
- 128 samples of food were tested
  – six STEC strains were isolated
  – three strains, from the mutton and the offal (*stx2c*, O148)
  – two strains, from the poultry pâté (*stx2c*, O-patterns: X and Y).
- The strains from the mutton were indistinguishable, using PFGE and molecular serotyping, from the human *stx2c*-strain, whereas the pâté isolates differed

Table III: Molecular typing of the 7 STEC strains (human and food)

Origin of the STEC strain	*stx1* gene	*stx2* gene	*Eae* gene	*Ehx* gene	O-patterns	Pulse type
HUS case	–[a]	***stx2c***	–	–	**148**	**P2**
Diarrhea case	*stx1*	–	*eaeA*	*ehx*	26	P1
Roasted mutton	–	***stx2c***	–	–	**148**	**P2**
Sheep liver	–	***stx2c***	–	–	**148**	**P2**
Sheep kidney	–	***stx2c***	–	–	**148**	**P2**
Poultry pâté (batch 1)	–	*stx2c*	–	w[b]	x	P3
Poultry pâté (batch 2)	–	*stx2c*	–	–	y	P4

[a] –: negative; [b] w: low intensity signal

Figures 2 and 3: Pulsetypes (fig 2) and O-patterns (fig 3) of strains isolated from food and human samples



M Molecular weight marker
1 HUS case
2 Roasted mutton
3 Sheep liver
4 Sheep kidney
5 Diarrhea case
6 Poultry pâté batch 1
7 Poultry pâté batch 2

Figure 2

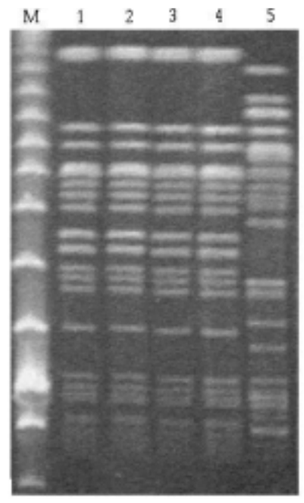


Figure 3

Control measures

- Slaughtering of the sheep herd at the family farm
- Destruction of leftover mutton
- Withdrawl of batches of contaminated poultry pâté
- Review of HACCP in poultry pâté production site

Discussion

- First documented outbreak of O148 STEC infection in France
- Source: consumption of roasted mutton
- Litterature review:
  – STEC outbreak linked to mutton consumption described for *E. coli* O157:H7
  – Sheep, a known reservoir of STEC
  – Contamination of sheep carcasses described for *E. coli* O157:H7 and other STEC
- STEC contamination of an industrial poultry pâté:
  – STEC contamination of the ingredients
  – Heating process 72-75°C for 60-70 minutes

  ➔ **Thermoresistant STEC strain or undetected failure in heating process?**
- Limits of cohort study:
  – None of the food items was found significantly associated with illness
- Limits of microbiological methods:
  – Multiple different isolates in cases and food
  – Phage typing and PFGE: not available at the time of decision making