

**Epidemia di infezione da *Escherichia coli* VTEC O104:H4
in Germania:
Quali indicazioni possiamo trarre ???**



EU Reference Laboratory for Escherichia coli
Istituto Superiore di Sanità, Rome, Italy



www.iss.it/vtec

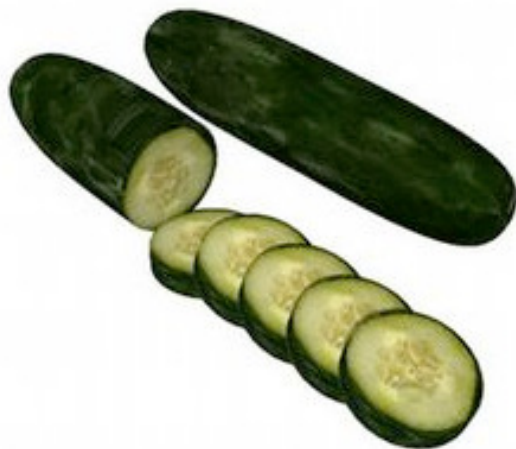
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Outbreak of Shiga toxin-producing *E. coli* in Germany

- ✓ Oltre 3.000 casi
- ✓ 800 casi di sindrome emolitico uremica
- ✓ 35 decessi
- ✓ Coinvolgimento verdure crude (**insalate** miste)
- ✓ Evidenza epidemiologica per **germogli** di specie varie

Outbreak of Shiga toxin-producing *E. coli* in Germany

- ✓ Allerte comunitarie (RASFF) per cetrioli
- ✓ Attenzione sui germogli e sui semi usati per la produzione



Uno spettro s'aggira per l'Europa: il cetriolo-killer.

La diarrea emorragica causata dall'infezione da parte di un ceppo aggressivo del batterio *Escherichia coli* sta causando viva preoccupazione nelle autorità sanitarie europee e nell'opinione pubblica.

Sotto accusa una partita di cetrioli coltivati in Spagna, ma in realtà si tratta più di un'illazione che di una certezza.



Outbreak of Shiga toxin-producing *E. coli* in Germany

Gestione delle emergenze

- ✓ Essere preparati (*Preparedness*)
- ✓ Comunicazione
- ✓ Cordinamento e chiarezza nelle competenze

Regulation EC No 882/2004 on official controls

The EU Reference Laboratory for *Escherichia coli*, including Verotoxigenic *E. coli* (VTEC)



Unit for Foodborne Zoonoses and Veterinary Epidemiology
Department of Veterinary Public Health and Food Safety
Istituto Superiore di Sanità, Rome, Italy



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EU Reference Laboratory for *E.coli*





International
Organization for
Standardization

Detection of pathogenic VTEC in food

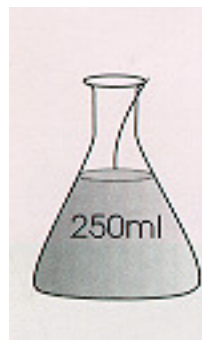


European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

STEP 1

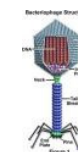
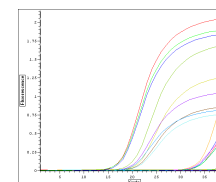


18 h



5 h

Real Time PCR
for *vtx* genes



**Negative samples are released
in 24 h**



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EU Reference Laboratory for *E.coli*





International
Organization for
Standardization

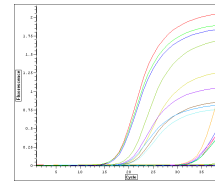
Detection of pathogenic VTEC in food



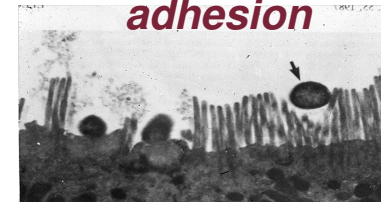
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Europäisches Komitee für Normung

STEP 2 (2h)

Real Time PCR
for *eae* gene

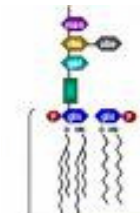
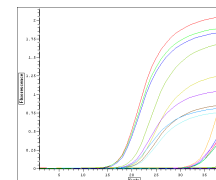


Attaching/Effacing
adhesion



STEP 3 (2h)

Real Time PCR for
serogroup-associated
genes



Presumptive detection of pathogenic VTEC in 30 h



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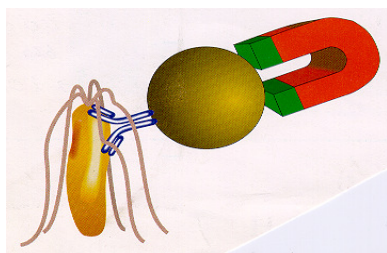
Detection of pathogenic VTEC in food



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STEP 4 (18 - 20 h)

O-specific IMS



Isolation of pathogenic VTEC in 48 h



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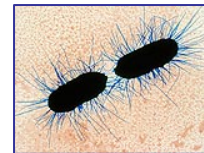
Detection of pathogenic VTEC in food



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Proficiency tests organized by the EU-RL VTEC

- 2008: Bacterial strains



- 2009: Carcass swabs



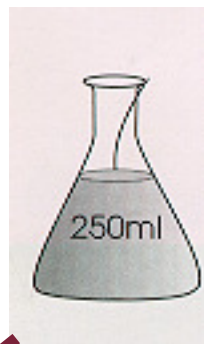
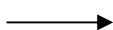
- 2010: Milk



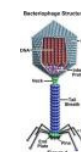
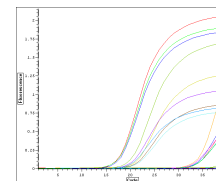
- 2011: Vegetables (spinach)



What happens with VTEC O104:H4

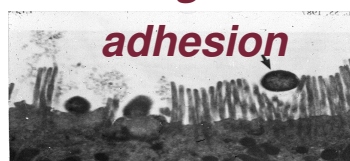


**Real Time PCR
for *vtx* genes**



~~**Real Time PCR
for *eae* gene**~~

Attaching/Effacing



VTEC O104:H4

Real Time PCR
Specific for O104 and H4 genes
**In close collaboration with the medical Reference
Laboratory at the SSI in Copenhagen**



EU-RL involvement in the outbreak

May 24 First report in PROMED



Methods

- ✓ **May 25** Alert to NRLs
- ✓ **May 27** 1st Draft method for VTEC O104 sent to NRLs
- ✓ **June 1** Outbreak strain received from Robert Koch
- ✓ **June 2** Method evaluated, revised and sent to NRLs
- ✓ **June 3-10** Reference DNA from VTEC O104 sent to the
NRLs as positive control



EU-RL involvement in the outbreak

May 24 First report in PROMED



Analyses

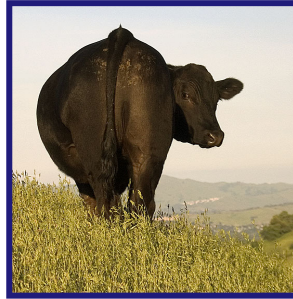
- ✓ **May 31** Samples (cucumber) from Hamburg to EU-RL
- ✓ **June 1** Outbreak strain received from Robert Koch
- ✓ **June 2** Results sent to DG SANCO

Visita del Commissario Europeo alla Sanità



Regulation EC No 776/2006

- **41 EU-RLs**, selected and designated for 5-years periods upon public calls



- **14 EU-RLs** for animal health
- **14 EU-RLs** for chemical risks in food and feed
- **13 EU-RLs** for biological risks in food and feed



45 Centri di Riferenza Nazionale

D.M. 4 ottobre 1999



Outbreak of Shiga toxin-producing *E. coli* in Germany

Gestione delle emergenze comunicazione

CORRIERE DELLA SERA*it*

2 Giugno

Batterio killer, oltre 2.000 casi in Europa

L'Oms: «Variante altamente tossica»

*Le sequenze genetiche mostrano che si tratta di una
forma mutante di E.Coli. Morte sospetta in Francia*

Outbreak of Shiga toxin-producing *E. coli* in Germany

CORRIERE DELLA SERA *it*

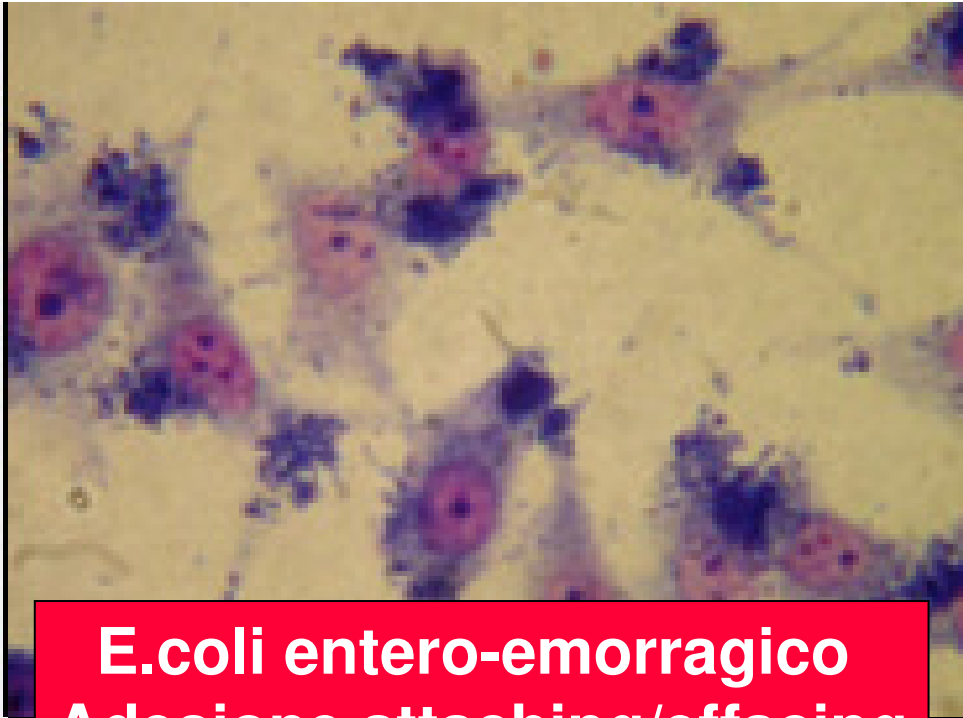


2 Giugno

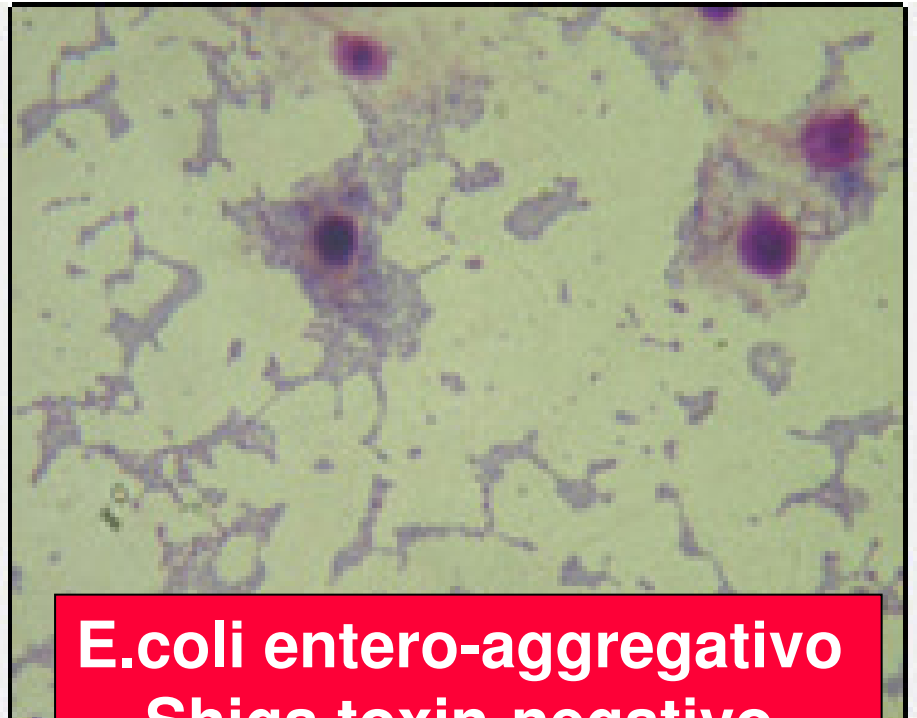
MILANO - L'Organizzazione mondiale della Sanità afferma che la variante di *E. Coli* trovata nei pazienti tedeschi contagiati «non è stata mai vista prima in un focolaio di infezione». Esperti cinesi che hanno analizzato i geni del ceppo di *Escherichia Coli*

tedesco affermano che il gruppo «è nuovo e altamente tossico».

L'ESPERTA - «Questo è un ceppo unico che non è mai stato isolato prima da pazienti e presenta diverse caratteristiche che lo rendono più virulento e capace di produrre maggiori tossine» ha



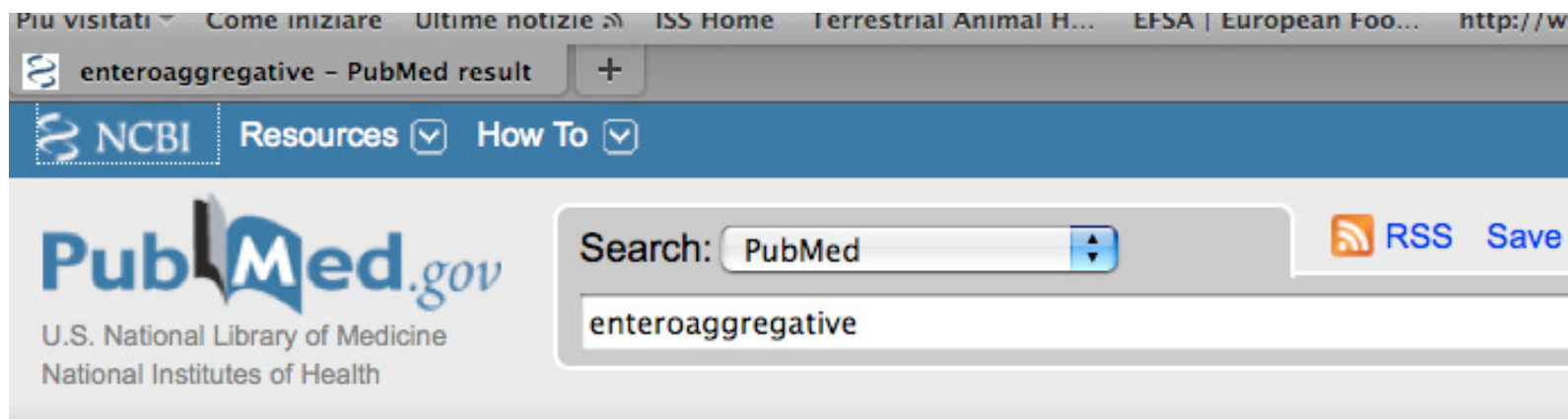
E.coli entero-emorragico
Adesione attaching/effacing



E.coli entero-aggregativo
Shiga toxin-negativo



E.coli Entero-Aggregativi



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- ☐ [Enteric pathogens associated with childhood diarrhea in tripoli-libya.](#)
1. Rahouma A, Klena JD, Crema Z, Abobker AA, Treesh K, Franka E, Abusnena O, Shammah H, Abudher A, Ghenghesh KS.
Am J Trop Med Hyg. 2011 Jun;84(6):886-91.
PMID: 21633024 [PubMed - in process]

Epidemia da E.coli Entero-Aggregativi in Italia

«paper no. jmm2008/001362 charlesworth ref: jmm2008/001362»

Epidemiology

Journal of Medical Microbiology (2008), 57, 000–000

DOI 10.1099/jmm.0.2008/001362-0

Enteroaggregative *Escherichia coli* associated with a foodborne outbreak of gastroenteritis

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This study investigated two foodborne outbreaks of gastroenteritis that occurred 10 days apart among individuals who had meals at the restaurant of a farm holiday resort. Mild gastrointestinal symptoms were reported and none of the patients needed hospitalization. Mean incubation times were 45 and 33 h, and the overall attack rates were 43.5 and 58.3%, respectively. Stool sample examination was negative for common enteric pathogens in both outbreaks. Specimens from 13 people involved in the second outbreak and 3 restaurant staff were examined for diarrhoeagenic *Escherichia coli*. An enteroaggregative *E. coli* (EAEC) strain of serotype O92:H33 was isolated from six participants and one member of staff. In particular, the EAEC strain was isolated from five of the six cases of diarrhoea examined. The strain showed an

E.coli emorragico con adesione Entero-Aggregativa

Focolaio epidemico di SEU in Francia - 1992

JOURNAL OF CLINICAL MICROBIOLOGY, Mar. 1998, p. 840-842
0095-1137/98/\$04.00+0
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Vol. 36, No. 3

Enteraggregative, Shiga Toxin-Producing *Escherichia coli* O111:H2 Associated with an Outbreak of Hemolytic-Uremic Syndrome

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FABIO MINELLI,¹ EDOUARD BINGEN,³ AND ALFREDO CAPRIOLI^{1*}

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Received 11 August 1997/Returned for modification 24 September 1997/Accepted 1 December 1997

Shiga toxin-producing *Escherichia coli* O111:H2 strains from an outbreak of hemolytic-uremic syndrome showed aggregative adhesion to HEp-2 cells and harbored large plasmids which hybridized with the enteraggregative *E. coli* probe PCVD432. These strains present a novel combination of virulence factors and might be as pathogenic to humans as the classic enterohemorrhagic *E. coli*.



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Thank you for your attention!

