

RISCHI DA CONTAMINAZIONE VIRALE

Franco M Ruggeri

DSPVSA, ISS, Roma



V. Santoro

Corso “Consumo di molluschi
bivalvi e rischi correlati”

Firenze, 20 Novembre 2012

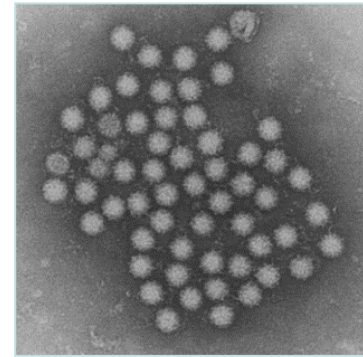


Direttiva Zoonosi 2003/99/EC

(Allegato I A Seconda fascia di priorità)

Agenti virali

- **Calicivirus**
- **Epatite A**
- **Influenza**
- **Rabbia**
- **Virus trasmessi da artropodi**



Agenti parassitari

- **Anisakiasi**
- **Criptosporidiosi**
- **Cisticercosi**
- **Toxoplasmosi**

Agenti batterici

- **Borreliosi**
- **Botulismo**
- **Leptospirosi**
- **Psittacosi**
- **Tubercolosi**
- **Vibriosi**
- **Yersiniosi**



“Pacchetto Igiene”, CE 2004





- Reg. (CE) 852/2004: igiene dei prodotti alimentari;
- Reg. (CE) 853/2004: norme su igiene per gli alimenti di origine animale;
- Reg. (CE) 854/2004: norme su controlli ufficiali sui prodotti di origine animale destinati al consumo umano;
- Reg. (CE) 882/2004: controlli ufficiali ... conformità alla normativa ... su mangimi e alimenti e ... salute e benessere degli animali

Questi regolamenti comunitari sono stati di recente integrati da:

- Reg. 2073/05: “criteri microbiologici applicabili ai prodotti alimentari”;
- Reg. 2074/05: “modalità di attuazione relative a taluni prodotti di cui al Reg. CE 853/04 e all’organizzazione di controlli ufficiali a norma dei Regg. 854/04 e 882/04 e deroga al Reg, 852/04 e modifica dei Regg 853/04 e 854/04”;
- Reg. 2076/05: “disposizioni transitorie per l’attuazione e modifica dei Regg. 853/04, 854/04 e 882/04”;
- Dir. CE 2002/99: norme di polizia sanitaria per produzione, trasformazione, distribuzione e l’introduzione di prodotti di origine animale per uso umano;



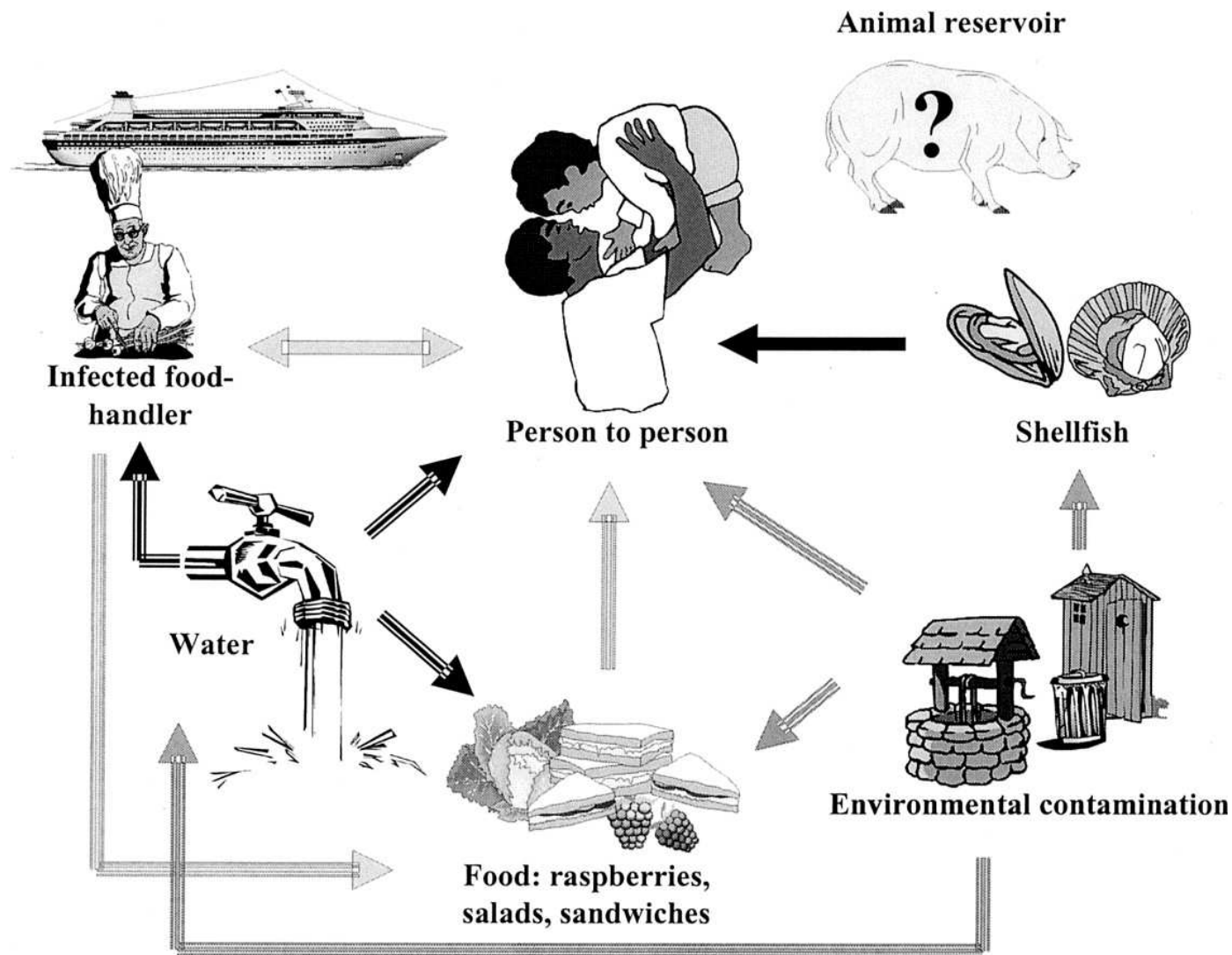
Table 1**Viruses transmitted by food.**

Family	Genus (name)	Capsid	Genome	Illness and incubation	Food transmission
<i>Adenoviridae</i>	<i>Adenovirus</i> (type 40–41)	Icosahedral, 65–80 nm	DNA, 35 kb	Gastroenteritis (moderate)	Rare
<i>Astroviridae</i>	<i>Astrovirus</i>	Icosahedral, 28–30 nm	ssRNA, 6.8 kb	Gastroenteritis (moderate)	Rare
 <i>Caliciviridae</i>	<i>Norovirus</i>	Icosahedral, 27–32 nm	ssRNA, 7.6 kb	Gastroenteritis, 1–3 days	Frequent: shellfish, berries, food handler
	<i>Sapovirus</i>	Icosahedral, 27–32 nm	ssRNA, 7.4 kb	Gastroenteritis, 1–3 days	Uncommon: oysters, food handler
<i>Coronaviridae</i>	<i>Coronavirus</i> (SARS)	Enveloped, 170 nm	ssRNA, 27–32 kb	Common cold, pneumonia, enteric disease	Suspected zoonotic, food handler
<i>Flaviviridae</i>	<i>Flavivirus</i> , Tick borne encephalitis virus (TBEV)	Enveloped, 40–60 nm	ssRNA, 11 kb	Fever, vomiting, fatigue, pain in the neck, back, encephalitis, 7–14 days	Rare: cow sheep goat milk
 <i>Hepeviridae</i>	<i>Hepevirus</i> (Hepatitis E virus)	Icosahedral, 32–34 nm	ssRNA, 7.2 kb	Hepatitis, 3–8 weeks	Rare: pig meat, oyster
<i>Orthomyxoviridae</i>	<i>Influenza A</i> (H5N1 virus)	Enveloped, 120–300 nm	Segmented ssRNA, 13.6 kb	Flu (fever, muscle pain),	Rare: bird meat (chicken, duck, geese)
<i>Paramyxoviridae</i>	<i>Henipavirus</i> (Nipah virus)	Enveloped, 150–350 nm	ssRNA, 15 kb	Influenza-like illness, febrile encephalitis	Rare, food suspected in two outbreaks
<i>Picornaviridae</i>	<i>Kobuvirus</i> (Aichi virus)	Icosahedral, 27–32 nm	ssRNA, 8.2 kb	Gastroenteritis, 1–2 days	Uncommon: shellfish
	<i>Enterovirus</i>	Icosahedral, 20–30 nm	ssRNA, 7.2 kb	Diverse clinical syndromes, 3–10 days	Rare
 	<i>Hepatovirus</i> (Hepatitis A virus)	Icosahedral, 27–32 nm	ssRNA, 7.4 kb	Hepatitis, 2–6 weeks	Frequent: shellfish, vegetables, food handler
<i>Reoviridae</i>	<i>Rotavirus</i>	Icosahedral, 3 layers, 70 nm	dsRNA, 11 genes 3.3–0.6 kb	Gastroenteritis, 1–3 days	Rare

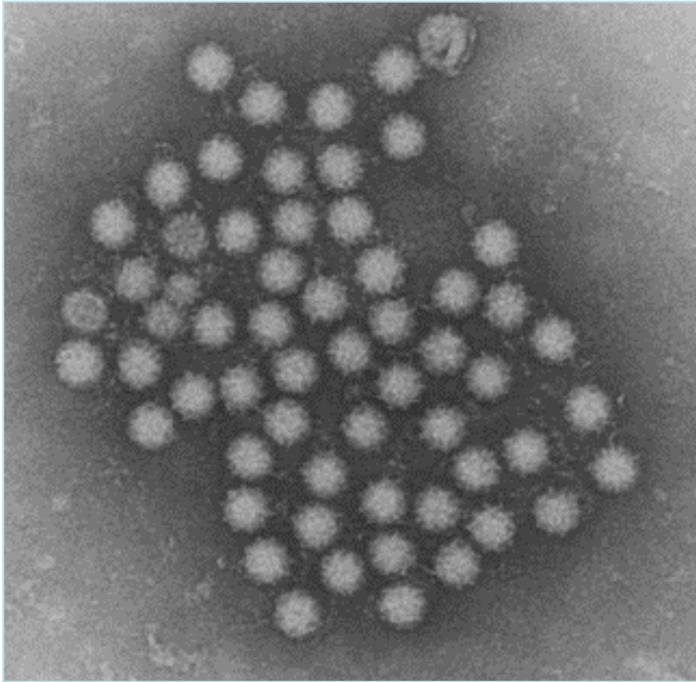
Grey shading: viruses frequently transmitted via food.



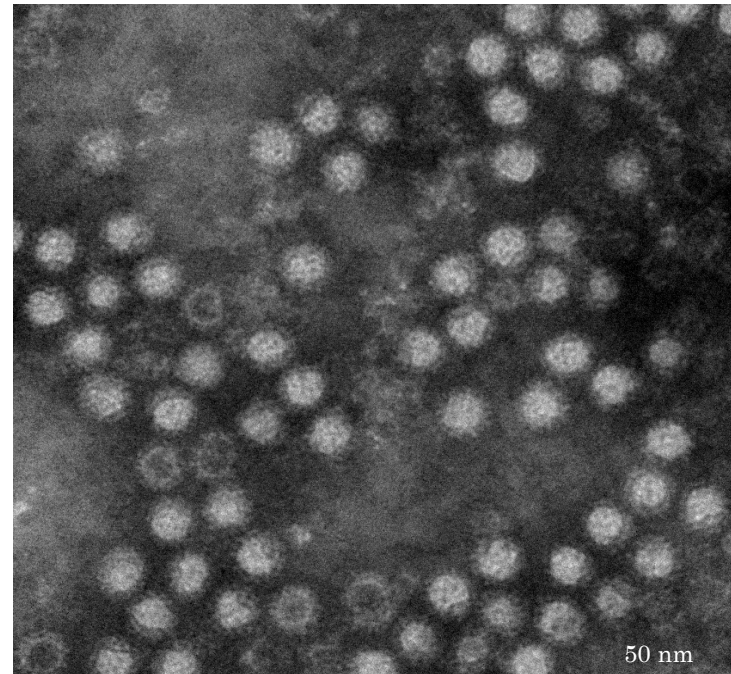
Food-borne viruses



Norovirus



Norwalk, Ohio



Roma



Gastroenterite acuta virale

	GE infantile endemica	GE epidemica
VIRUS	Rotavirus (gruppo A) Astrovirus Adenovirus enterici Rotavirus (gruppo C) Calicivirus (NoV & SaV) Coronavirus/torovirus Picobirnavirus Aichiivirus	Calicivirus (NoV & SaV) Rotavirus (gruppo B) Astrovirus
TRASMISSIONE	Fomites, droplets, aerosol; persona-persona	Alimenti, acque, droplets, aerosol, persona-persona
 RESERVOIR	Uomo, animali?	Uomo, animali? 
ANTICORPI	Alta prevalenza > 5 anni	Sieroconversione nelle epidemie
IMMUNITA'	Buona (rotavirus)	A breve termine (calicivirus)
VARIABILITA' VIRALE	Limitato numero di sierotipi (eccetto calicivirus)	Limitato numero di sierotipi (eccetto calicivirus)
MISURE DI SANITA'	Vaccino per RV (gruppo A)	Controllo degli outbreaks; miglioramento salubrità e manipolazione alimenti



Factors involved in the emergence of infectious diseases

Selected factors contribute to the emergence/re-emergence of infectious diseases^{25,26}. These factors, which frequently differ for 'newly emerging', 're-emerging/resurging' and 'deliberately emerging' diseases, include genetic, biological, and social, political and economic factors.

- ➔ • Microbial adaptation and change
- ➔ • Human susceptibility to infection
- ➔ • Climate and weather
- ➔ • Changing ecosystems
- ➔ • Human demographics and behaviour
- ➔ • Economic development and land use
- ➔ • International travel and commerce
- ➔ • Technology and industry
- ➔ • Breakdown of public health measures
- Poverty and social inequality
- War and famine
- Lack of political will
- Intent to harm

Host Range and Emerging and Reemerging Pathogens

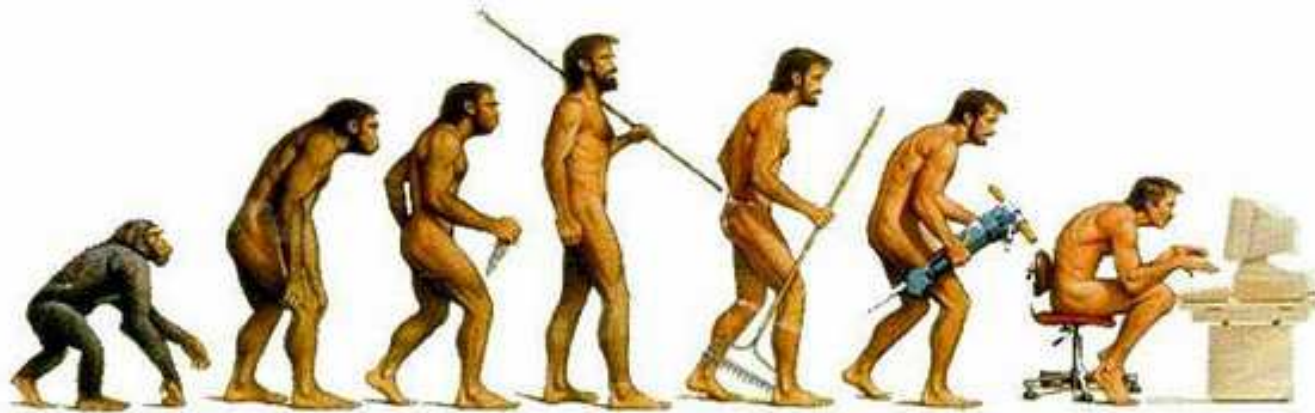
Mark E.J. Woolhouse* and Sonya Gowtage-Sequeria*

An update literature survey identified 1,407 recognized species of human pathogen, 58% of which are zoonotic. On the total, 177 are regarded to as emerging or reemerging. Zoonotic pathogens are twice as likely to be in this category as are nonzoonotic pathogens.

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 11, No. 12, December 2005



Rudimenti di Evoluzione



Mutation rates along the evolutionary path

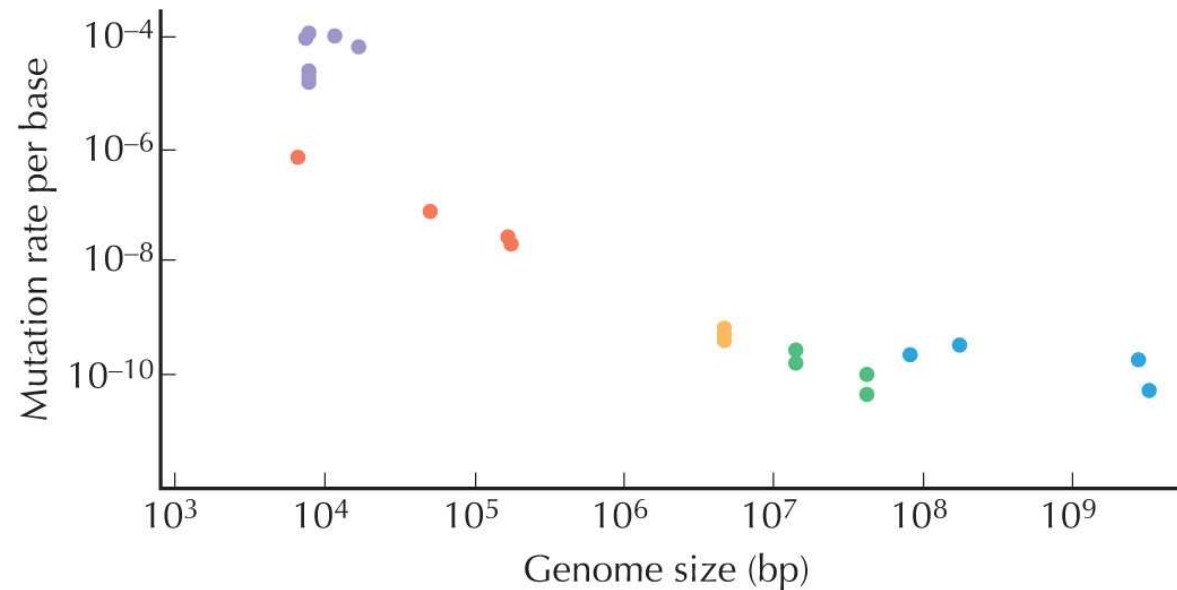


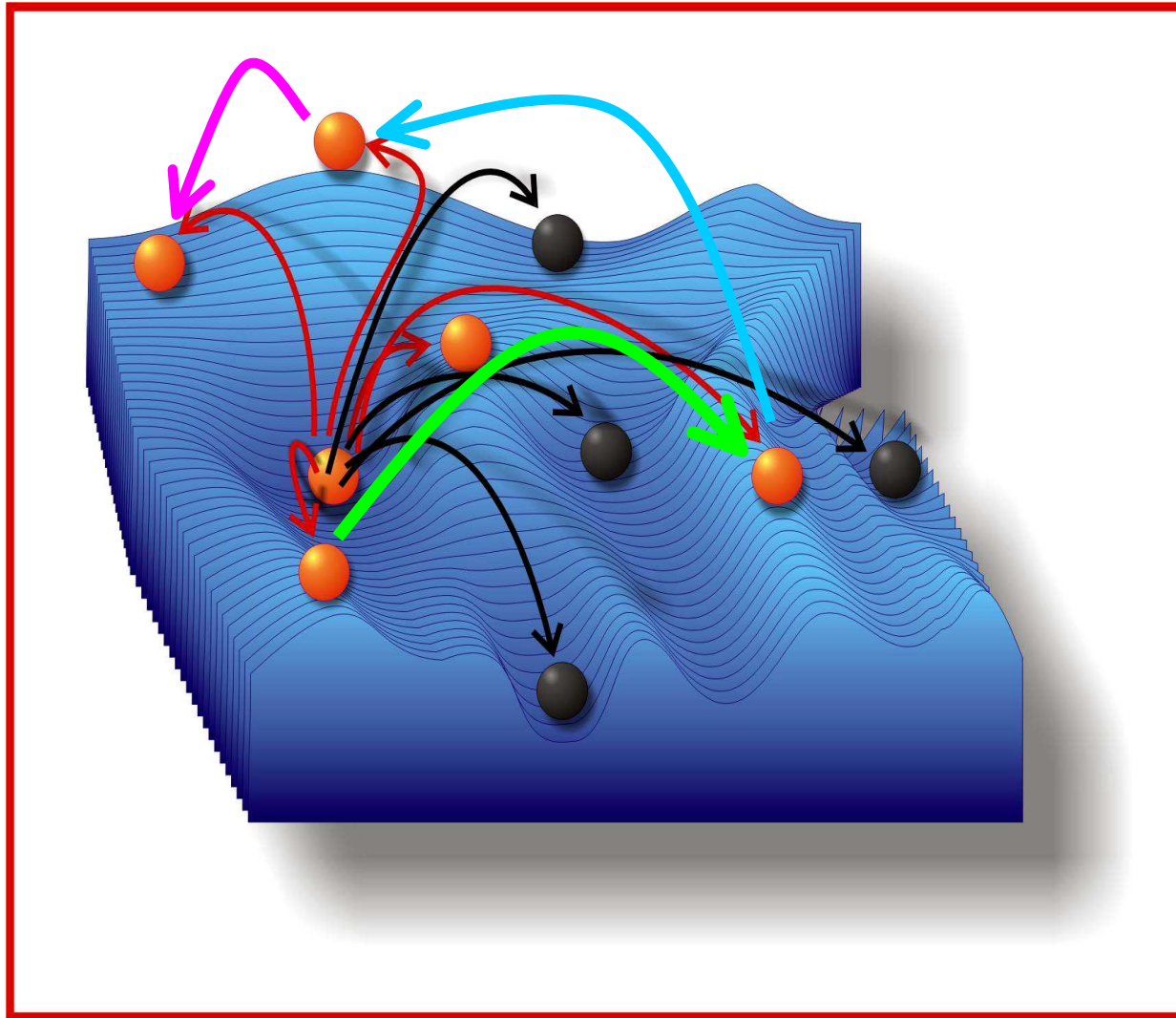
FIGURE 23.1. Mutation rates per base vary between organisms across about six orders of magnitude. (Purple) RNA viruses; (red) DNA-based viruses; (orange) *Escherichia coli*; (green) fungi; (blue) nematode; *Drosophila*; mouse; human (left to right).

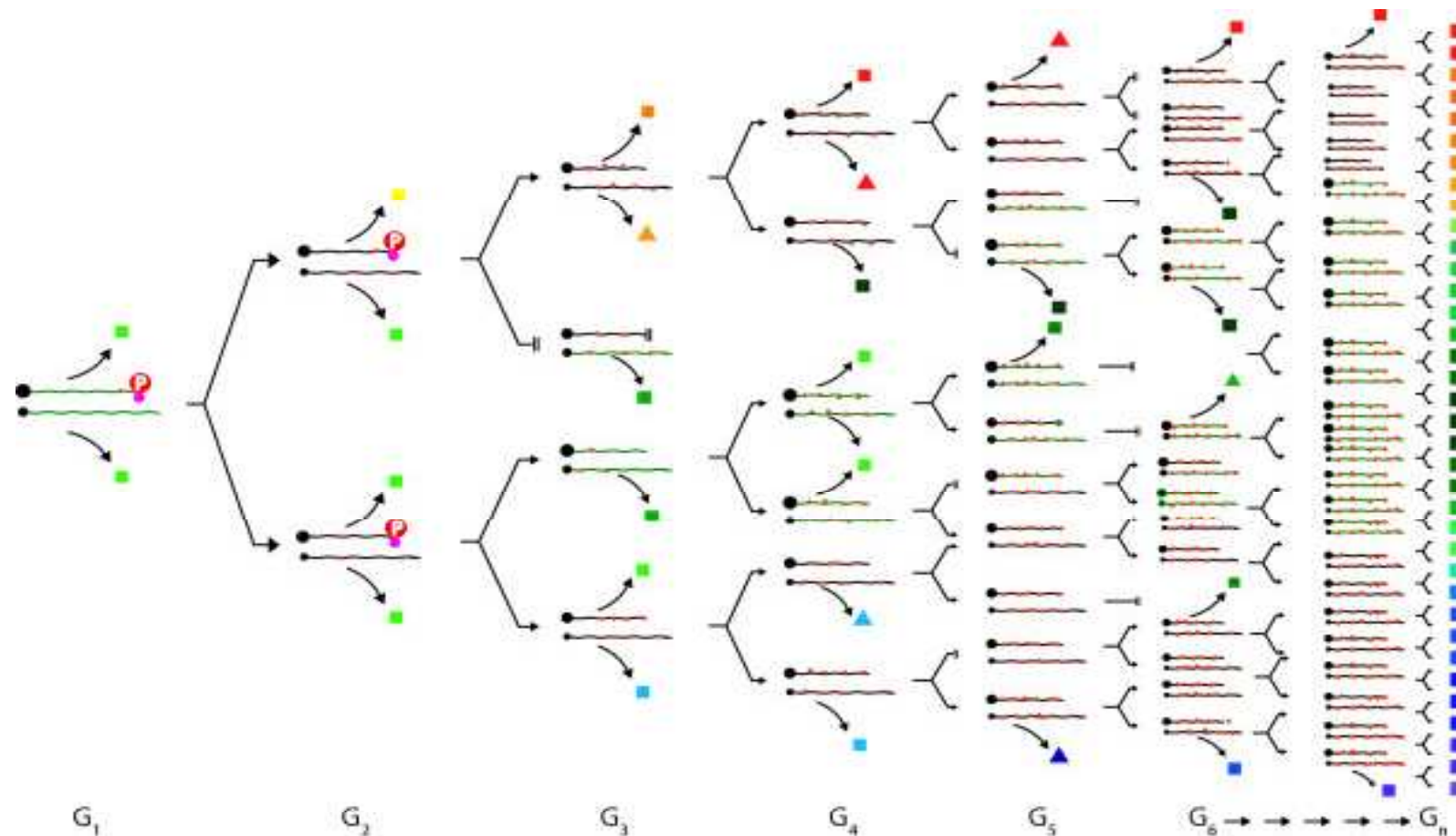
23.1, redrawn from Sniegowski P. et al., *BioEssays* **22**: 1057–1066, © 2000 John Wiley & Sons

Evolution © 2007 Cold Spring Harbor Laboratory Press



High mutation rates favor rapid (RNA) virus evolution





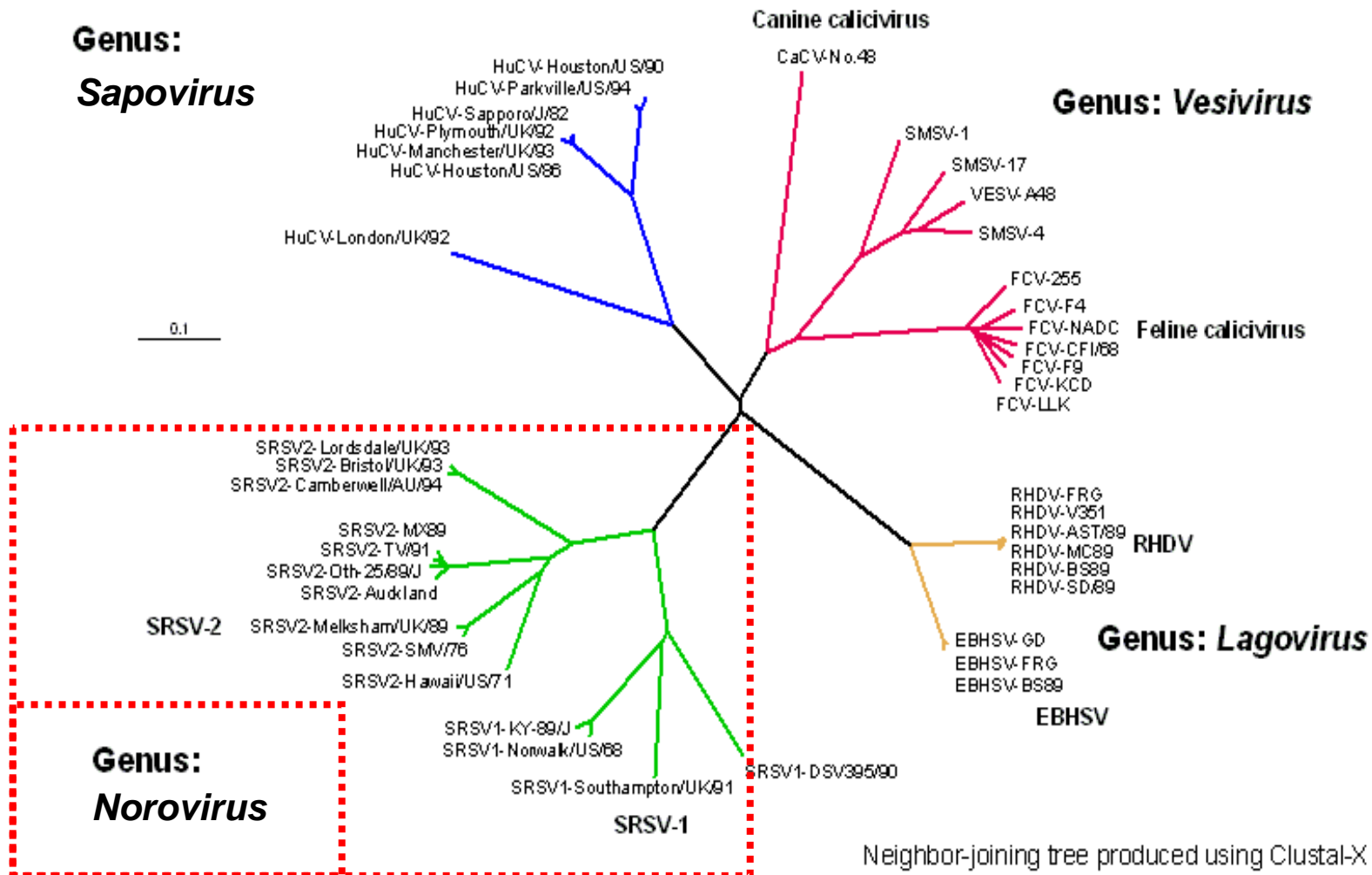
Simplified, two dimensional clade diagram of hyperdimensional viral RNA protein sequence-space. Because of RNA_{pol} (P) infidelity and Müller's ratchet, mutations () are introduced into each RNA template synthesized, and progressively accumulate, resulting in an RNA quasispecies with sequence progressively divergent from consensus sequence. Translation results in a spectrum of proteins (, , , etc.) with properties that also vary progressively from wild-type sequence () to highly variant proteins (, , etc.). Some RNAs will be so abnormal that translation or replication fails or is truncated (), while others will code for grossly defective proteins (, etc.).

The relationship between caliciviruses capsid proteins

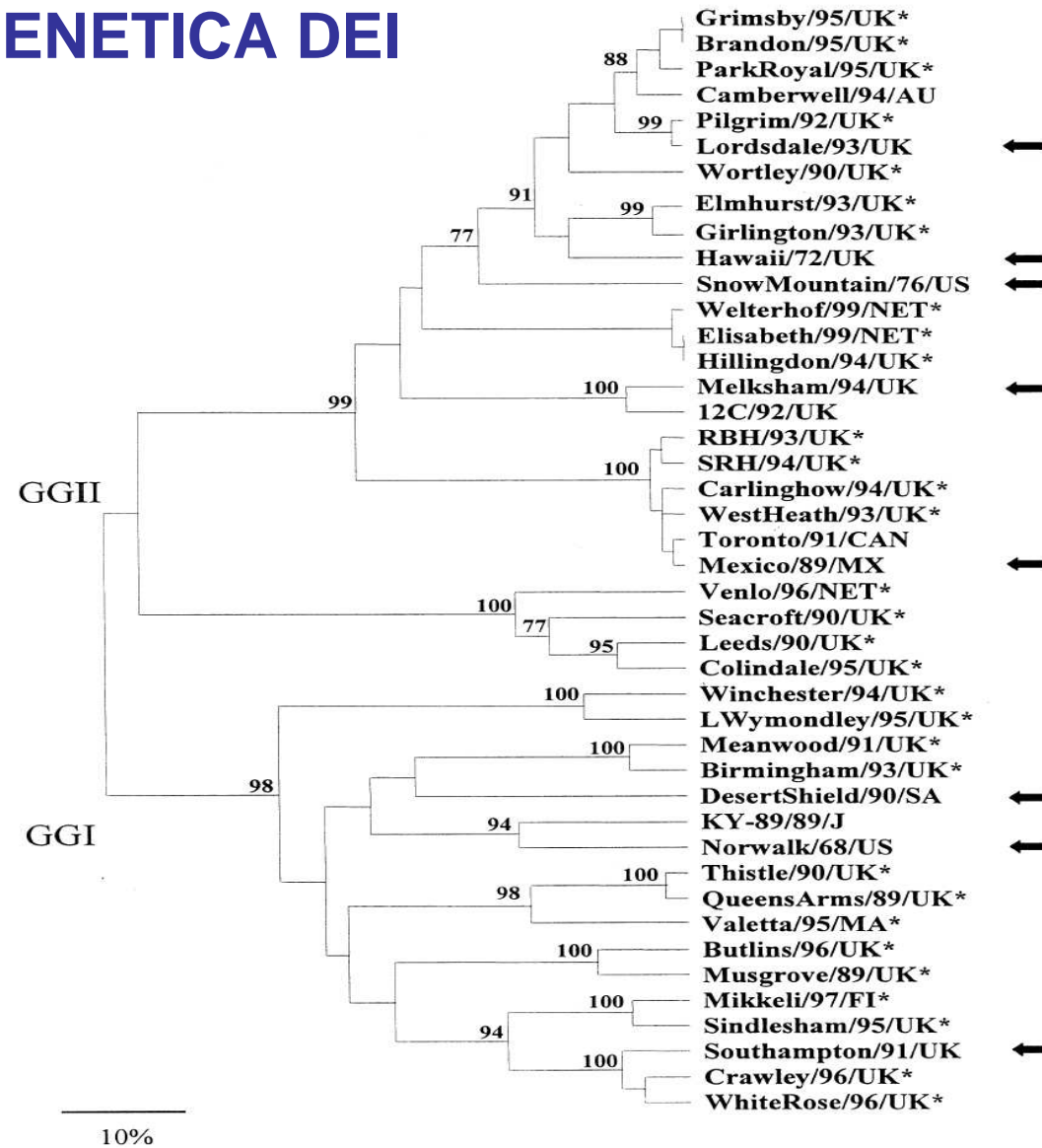
N.J. Knowles, 24 May 1998

Genus:
Sapovirus

Genus: Vesivirus

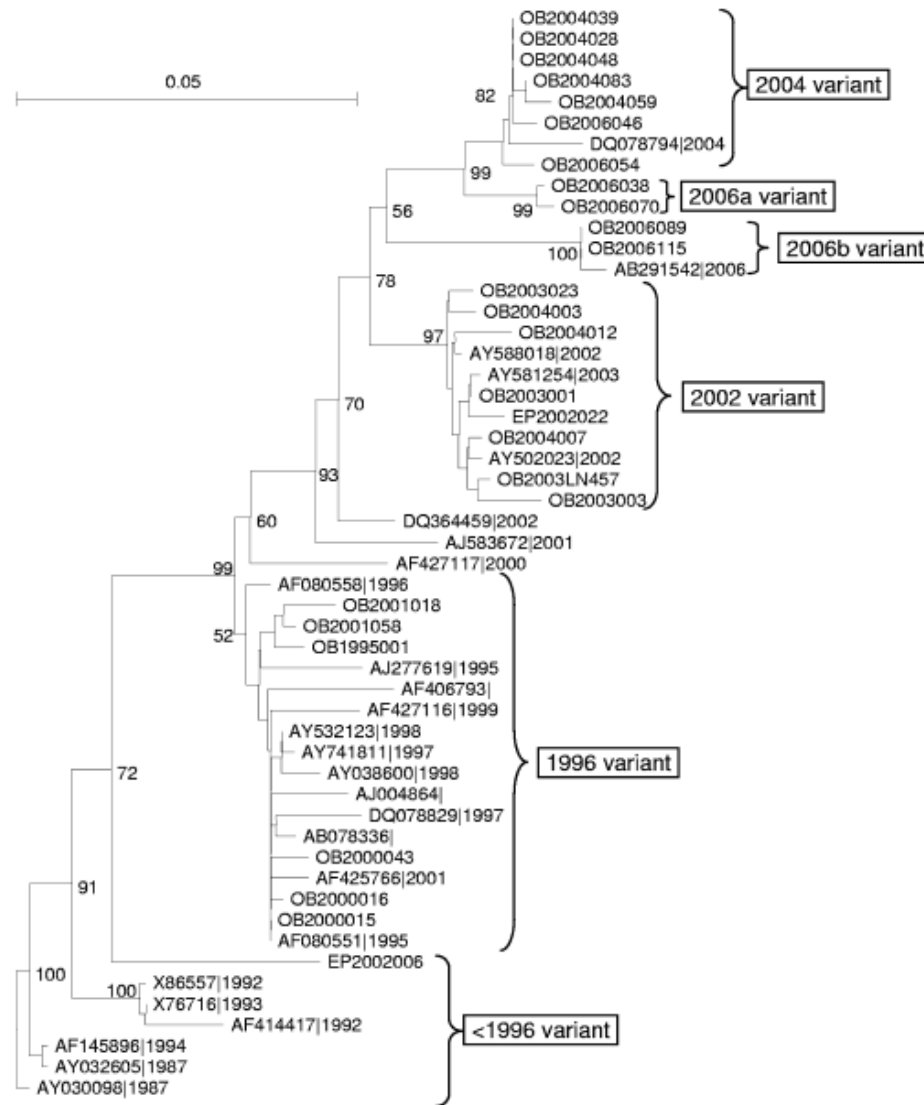


DIVERSITA' GENETICA DEI NOROVIRUS



Vinje J (2000). Arch Virol 145: 223–241

VARIANTI CEPI GII.4 LORDSDALE



Siebenga et al., 2007

Dipartimento di Sanità pubblica veterinaria e sicurezza alimentare



Evolution of the capsid gene of GGII.4 NoV

	1987	1994	1993	1993	1995	1999	2000	2001	2001	2002	2002	2002	2004	2004
SeqNames	AY032605	AF145896	X76716	X86557	AJ004864	AF427113	AF427117	GR5-GR28	AJ583672	O2g1092	AY502023	GR1-GR18	OB20040317	Lyons
6	S	S	N	N	N	N	N	N	N	N	N	N	N	-
16	A	A	A	A	T	T	T	T	T	T	T	T	T	-
51	I	I	V	V	V	V	V	V	V	V	V	V	V	-
97	S	S	S	S	A	A	A	A	A	A	A	A	A	-
176	H	H	N	N	N	N	N	N	N	N	N	N	N	-
178	S	S	S	S	S	S	S	S	P	P	P	P	P	-
180	L	L	L	L	I	I	I	I	I	I	I	I	I	-
197	D	D	D	D	D	D	D	D	D	E	E	E	D	-
232	T	T	T	T	T	T	T	T	T	T	T	T	S	S
235	I	I	V	V	I	I	I	I	I	I	I	I	I	I
242	S	S	S	S	S	S	S	S	T	T	T	T	T	T
254	Y	Y	Y	Y	Y	Y	Y	Y	F	F	F	F	F	F
284	A	A	A	A	A	A	A	A	P	P	P	P	P	P
289	N	N	N	N	T	T	T	T	T	T	T	T	T	T
300	S	S	S	S	S	S	S	S	T	T	T	T	T	T
301	H	H	H	H	H	H	H	H	H	H	H	H	Q	Q
302	D	D	D	D	D	D	D	D	D	N	N	N	N	N
313	S	S	S	S	N	N	N	N	N	N	N	N	N	N
333	K	K	K	K	K	K	K	K	K	R	R	R	K	K
350	A	A	A	A	A	A	G	A	G	G	G	G	G	G
359	S	S	S	S	S	S	S	S	S	D	D	D	S	S
369	V	V	V	V	V	V	I	V	V	I	I	V	V	V
371	F	F	F	F	Y	Y	F	Y	Y	F	F	F	F	F
376	N	N	N	N	N	N	N	N	N	N	N	N	S	S
380	Q	Q	Q	Q	Q	Q	X	Q	E	E	E	E	E	E
386	K	K	K	K	K	K	K	K	K	K	K	R	R	R
393	I	I	I	I	I	I	I	I	V	V	V	V	V	V
417	G	G	G	G	G	G	G	G	G	G	G	G	S	S
463	L	L	L	L	Q	Q	Q	Q	Q	Q	Q	Q	Q	L
469	A	A	A	A	A	A	A	A	A	A	A	A	S	S
501	I	I	I	I	V	V	V	V	V	V	V	V	V	V
508	P	P	P	P	P	P	P	P	P	Q	Q	Q	Q	Q
515	I	I	L	L	I	I	I	I	I	I	I	I	I	I
540	T	T	T	T	A	A	T	A	T	T	T	T	A	A

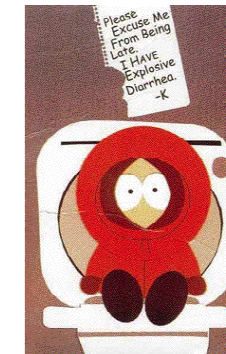
Vennema et al., Rome 2007

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GASTROENTERITE DA NOROVIRUS



- ✓ Sintomi: diarrea, vomito, crampi addominali, febbre e nausea
- ✓ Periodo di incubazione: 12-48 ore
- ✓ La patologia ha un decorso acuto e auto-limitante (24-60 ore)
- ✓ I sintomi scompaiono subito dopo la fase acuta, spesso senza ricorso ad ospedalizzazione
- ✓ Alto potenziale epidemico per la ridotta carica infettante ($<10^2$), l'alta resistenza nell'ambiente e l'assenza di immunità persistente



NOROVIRUS INCUBATION PERIOD

- Normally 18 – 36 hours after infection
- In some cases, as short as 12 hours after exposure
- Infected persons not usually contagious during norovirus incubation period
- People usually contagious after beginning to feel ill, for at least 3 days after recovery
- Some people may be contagious for as long as 2 weeks after recovery
- Therefore, it is particularly important to use good hand washing and other hygienic practices after recovering from norovirus illness.



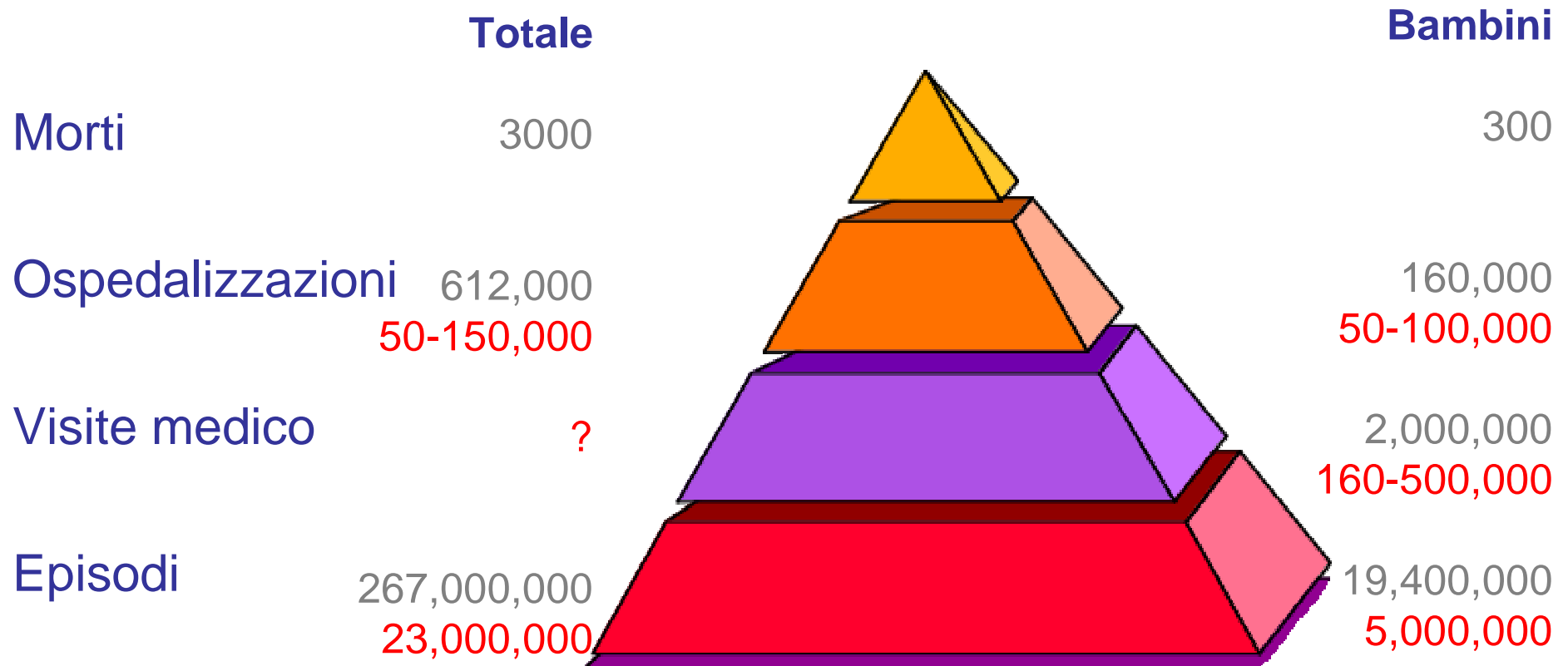
Kaplan's criteria:

- * Vomiting in more than half of the affected persons;
- * Mean or median incubation period of 24-48 hours;
- * Mean or median duration of illness of 12-60 hours; and
- * No bacterial pathogen in stool culture.



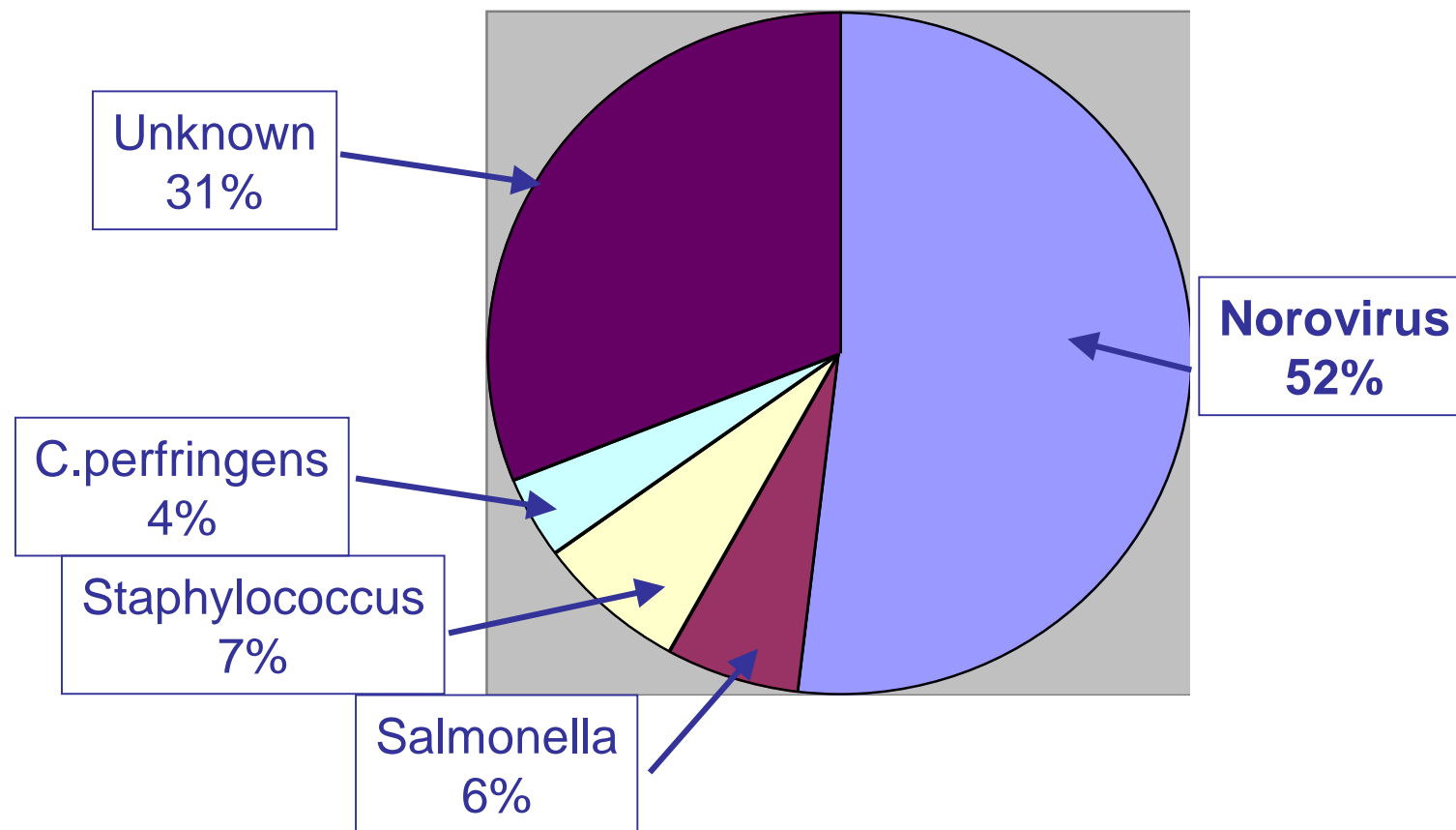
LE GE ACUTE NEGLI USA NEL 3° MILLENNIO

LA “QUOTA” DEI NOROVIRUS



Glass et al, 2007

Conferma di laboratorio in epidemie di GE, US 2001



Jones et al. CID, 2004

A Football-Borne Virus

By Kristin Leutwyler

RELATED TOPICS [How Things Work](#)

When Duke University's football team lost to Florida State's Seminoles on {

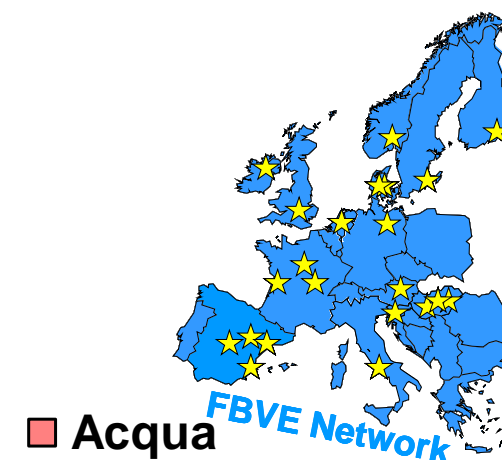
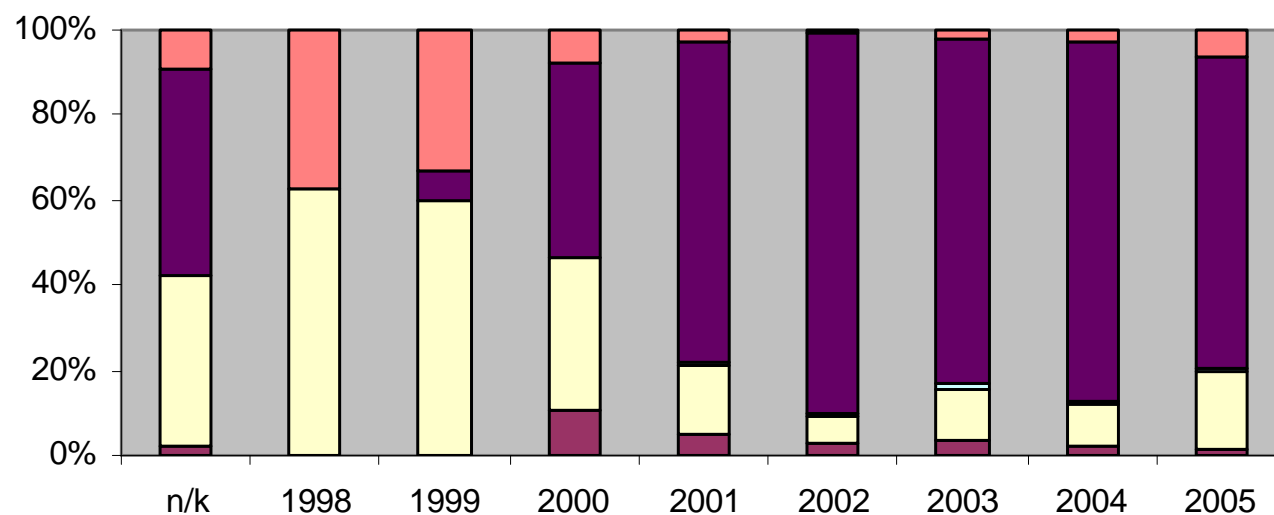


Person-to-person transmission of Norovirus



Dipartimento di Sanità pubblica veterinaria e sicurezza alimentare

Vie di Trasmissione (per anno/per epidemia)



No. = 3728

Non vengono riportate le epidemie la cui via di trasmissione non è nota



Dati FBVE 2006; elaborati da John Harris,
Health Protection Agency, London

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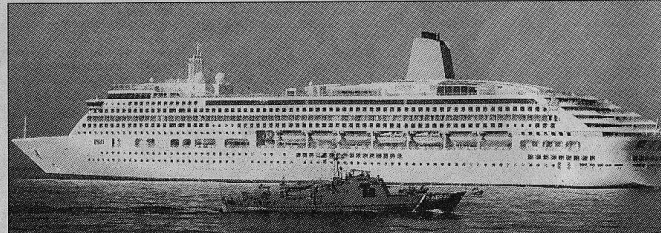
IN CROCIERA CON NOROVIRUS

La crociera degli appestati

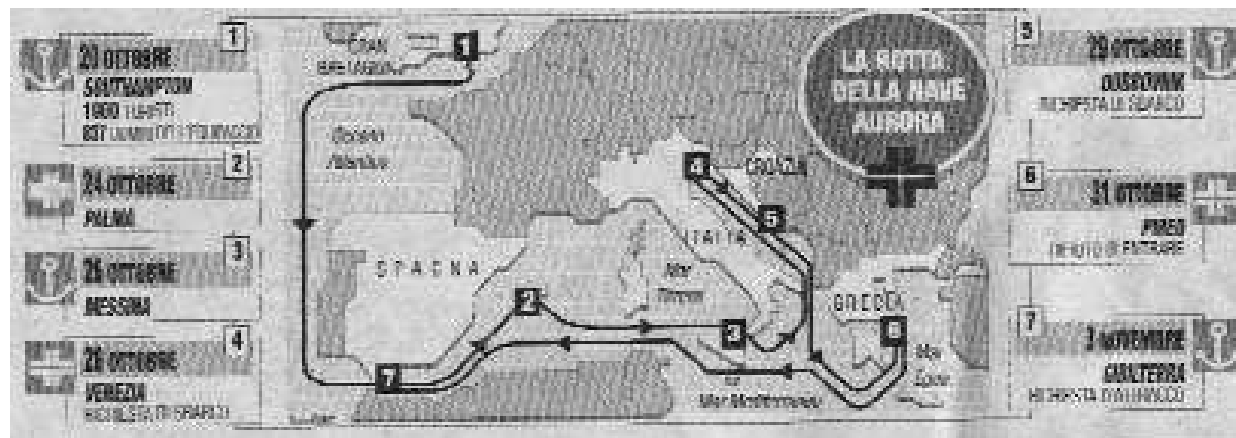
Una nave con 450 turisti ammalati respinta da tre porti

DAL NOSTRO CORRISPONDENTE
ENRICO FRANCESCHINI

LONDRA — Lo slogan era un classico: «Farete una vacanza indimenticabile». Nessuno potrà dire, tra i passeggeri dell'Aurora, che fosse esagerato: non scorderanno per un pezzo la crociera partita il 20 ottobre da Southampton, nel sud dell'Inghilterra, per due settimane di *grand tour* del Mediterraneo. E non la scorderà neppure la P&O,



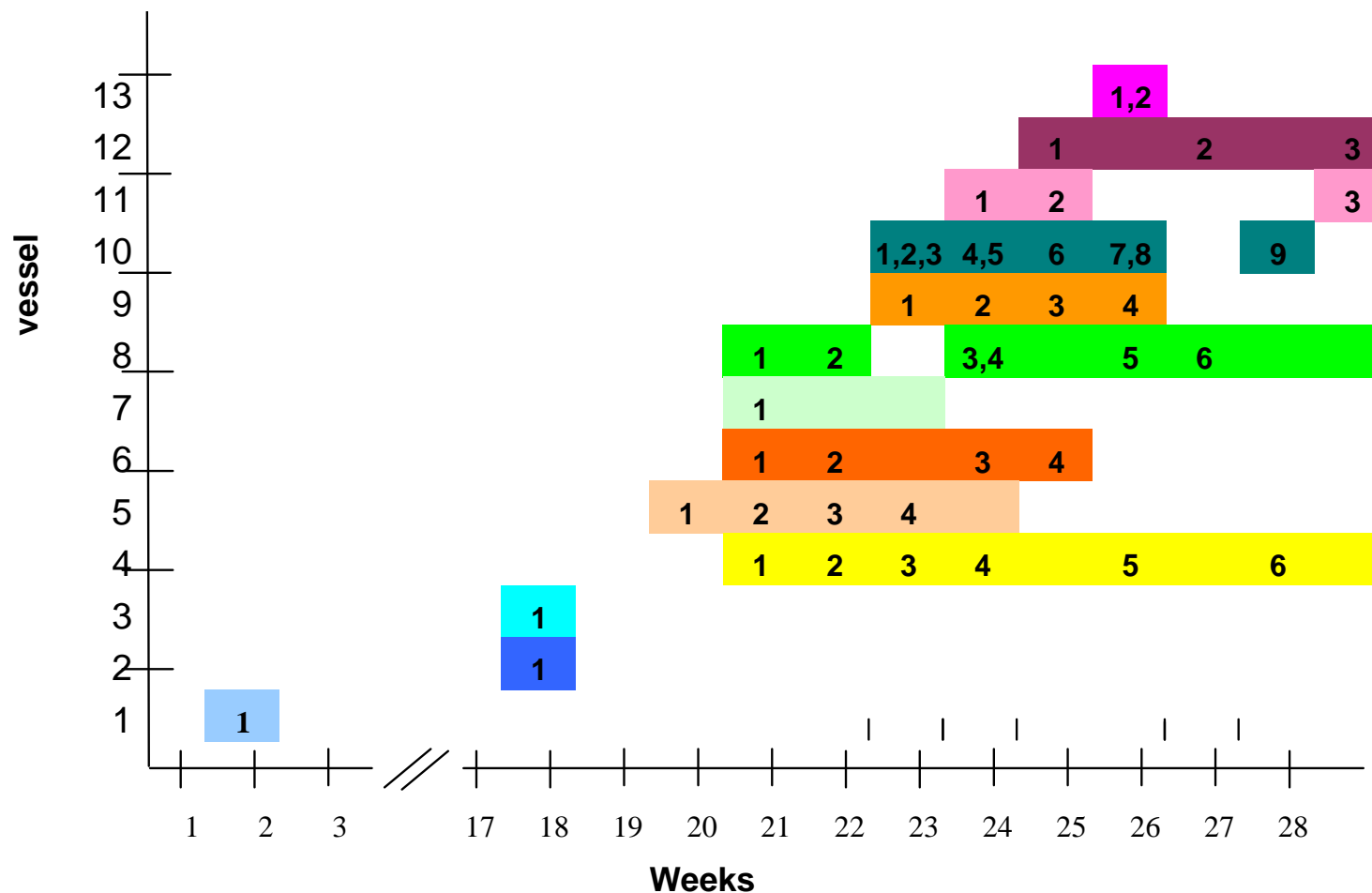
manco il tradizionale battesimo, facendo finire in mare la bottiglia di champagne. Al primo viaggio, la nave ebbe un'avaria e dovette essere rimorchiata in porto. L'anno scorso ha sofferto un altro virus, di minori dimensioni. La crociera "indimenticabile" di questi giorni costava 4 mila sterline (quasi 6 mila euro) a testa: ora centinaia di sposini in luna di miele, famiglie, coppie di pensionati, annunciano che faranno causa alla società armatrice per farsi ri-



“La Quiete dopo la ... Tempesta ... Perfetta”



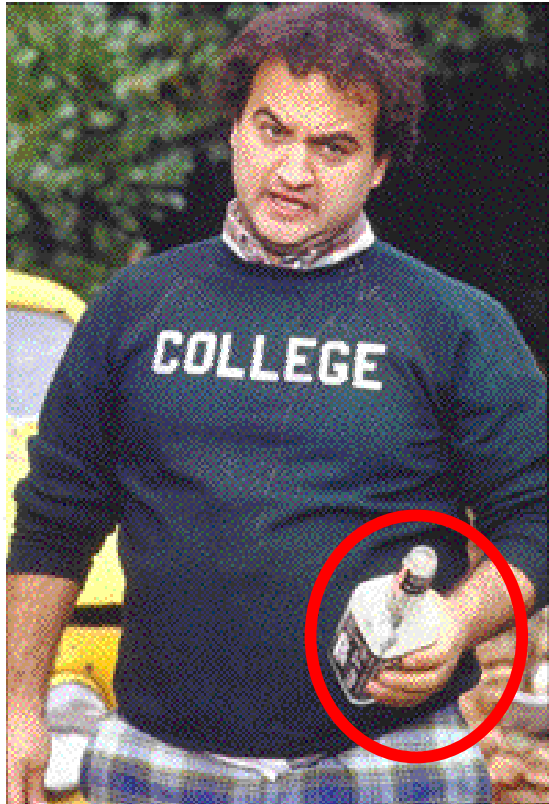
EPIDEMIE DI GE DA NOROVIRUS PER NAVE PER SETTIMANA



L. Verhoef, RIVM



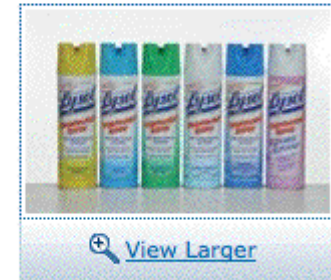
Disinfezione



Cleaning & Sanitary Supplies | General Purpose Cleaners

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Lysol® Brand III Aerosol Disinfectant is highly effective against TB, MRSA, HIV-1 (AIDS virus), poliovirus Type 1, hepatitis A, Influenza A H1N1 virus and Norovirus. Tuberculocidal, virucidal, fungicidal, bactericidal. Eliminates odors and prevents the growth of mold and mildew. EPA Registration # 777-99-675.



Norovirus Blog : Norovirus Outbreaks

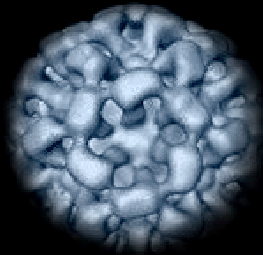
http://www.noroblog.com/articles/norovirus-outbreaks/

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Schools reopen as bug brought under control

Posted on September 10, 2007 by Norovirus Attorney

Sandwiches supplied to two schools in New Jersey were to blame for the norovirus outbreak last week. [Full Story from the Jersey Evening Post](#)



Haute Vallée head teacher Bob Fairhurst said that the school had taken advice from health experts and was insisting that staff did not come back until at least 48 hours after their symptoms stopped to prevent the illness from spreading.

He added that sensitive areas of the school had been disinfected over the weekend as part of a 'deep clean' of the premises.

TAGS: [Norovirus Outbreaks](#)

Completato



Pool Sickness Tops 100 Cases

Posted on July 19, 2007 by Norovirus Lawyer

Since the pool was closed on July 11, to date there are 123 sick children and 8 people with secondary illnesses who were never even in the water. [Full Story](#)



The Chester County Health Department told Action News it has conducted interviews with more than 100 people, and sent more than 100 samples from patients, plus pool water to the state health labs. In addition to the children sickened, at least 14 of the 38 workers at the pool have experienced symptoms.

Early tests revealed [norovirus](#) in the water, and some stool samples from people who had been in the water.

Rapid communications

IMPORT OF NOROVIRUS INFECTIONS IN THE NETHERLANDS AND IRELAND FOLLOWING PILGRIMAGES TO LOURDES, 2008 – PRELIMINARY REPORT

L Verhoef (linda.verhoef@rivm.nl)¹, E Duizer¹, H Vennema¹, J Siebenga¹, Corine Swaan¹, L Isken¹, M Koopmans¹, K Balay², P Pothier², Paul McKeown³, G van Dijk⁴, P Capdepon⁵, G Delmas⁶

1. National Institute for Public Health and the Environment, Center for Infectious Disease Control, Bilthoven, the Netherlands

2. National Reference Centre for Enteric Viruses, Dijon, France

3. Health Protection Surveillance Centre, Dublin, Ireland

4. Municipal Health Service West-Brabant, Breda, the Netherlands

5. Direction Départementale des Affaires Sanitaires et Sociales (District Health and Social Services, DDASS) des Haute Pyrénées, France

6. Institut de Veille Sanitaire (French Institute for Public Health Surveillance, INVS), Saint Maurice, France

Between mid-September and 19 October 2008, nine clusters of norovirus infection involving around 90 primary cases and over a hundred secondary cases were identified in patients from the Netherlands, Ireland, Italy and France, linked to pilgrimage to Lourdes, France.

A group of 10 patients and 14 health workers at the institution had visited Lourdes between 26 September and 1 October as part of a group of 1,025 Dutch pilgrims. On 29 September, one of the health workers started showing symptoms of AGE that lasted 24 hours and made it necessary that she stayed in the hotel room. During the return trip by train on 1 October, one of the patients in the group became symptomatic and required medical assistance. After the group had returned to the Netherlands, the virus spread within the institution.



Epidemia di gastroenterite. Non c'è allarme

S. BORTOLO. Causata da un virus molto infettivo, non comporta però complicazioni. A soffrirne è anche il personale

«Questo virus si estingue da solo, chi è colpito se la cava in pochi giorni Negli ambienti comunitari (ospedali, case di riposo, scuole) è frequente»

18/03/2009

- A +



Vicenza. «Lo scorso anno - dice il direttore medico Livio Dalla Barba - andò molto peggio. Adesso ce la caveremo in tre giorni. È tutto sotto controllo».

Epidemia di gastroenterite al S. Bortolo. "Epicentro" nel reparto di medicina diretto da Giorgio Vescovo, al terzo piano del monoblocco. Una ventina le persone colpite dall'infezione, che non ha risparmiato neppure il personale. Due infermieri sono stati spediti velocemente a casa. La struttura adesso è isolata. Obbligatorio l'uso della mascherina e dei guanti, per evitare al virus di trasmettersi. Molti letti sono stati sgomberati. I pazienti meno problematici sono stati dimessi.



Al S. Bortolo dicono che tali infezioni non sono infrequenti



PIÙ VISTI

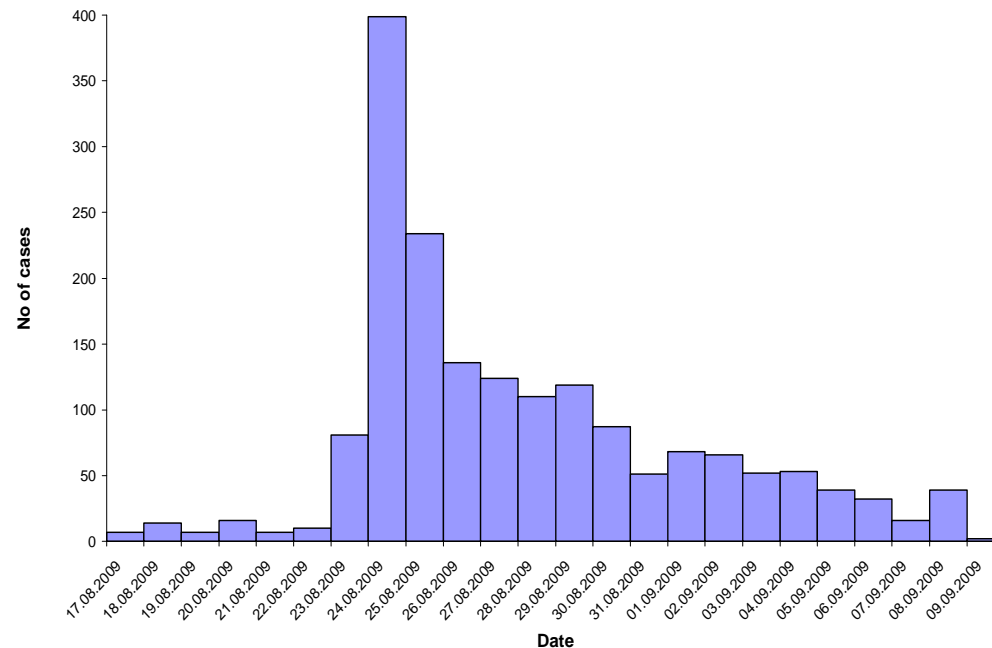
1. L'orso è in vacanza nel Bellunese
2. L'imprenditore Dalle Rive conferma
3. Montecchio, il calciatore sposa la pr
4. «Eleggiamo Vicenza capitale moral d'Europa»

VICENZA CALCIO

Massive outbreak of viral gastroenteritis in the capital of Montenegro associated with a contaminated municipal water supply, 2008

SUMMARY

On 24 August 2008, an outbreak alert ... environmental investigation assessed the water distribution ... from 24 August to 7 September, 1699 cases were reported in Podgorica (population about 136,000) ... 6 different norovirus strains ...



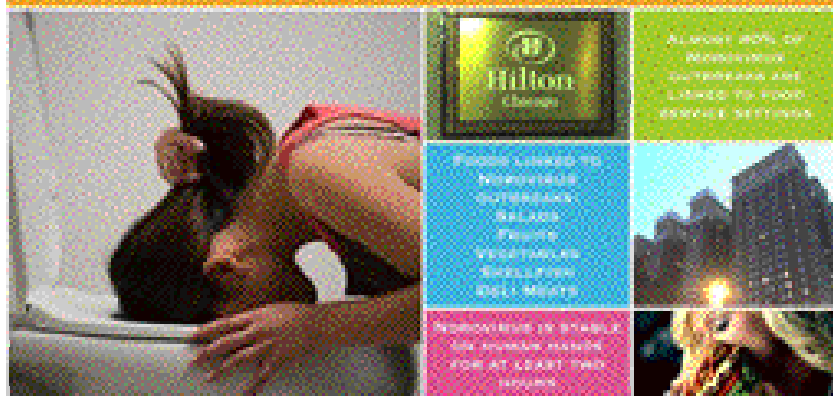
Werber et al, Epidemiol Infect, 2009

Dipartimento di Sanità pubblica veterinaria e sicurezza alimentare

International Food Safety Network Infosheet August 22, 2007

Norovirus is a problem for the food service industry

www.foodsafetyinfo.edu www.foodsafetyinfosheets.ksu.edu



Over 100 reported ill with norovirus after conference at Hilton hotel

More than 100 people reported getting sick after attending a conference at the Hilton Chicago hotel in July. Health officials say the kitchen at the hotel passed an inspection and hotel employees are cooperating with the ongoing investigation to identify the source, as yet undetermined source. The department said there was no evidence of ongoing transmission of illness from the Hilton kitchen or anywhere else conventioners may have eaten.

Norovirus outbreaks like this often occur throughout North America; food handlers can reduce the risk of making patrons ill with good handwashing practices and personal hygiene.

Dr. Christine Moe of Emory University reported recently at a conference on viruses in food service that:

- Some norovirus infections occur without symptoms
- Infected people can shed very high numbers of norovirus in their poop
- Viral shedding can sometimes occur for 3 weeks after symptoms have resolved
- The majority of reported norovirus outbreaks are associated with food service settings or events
- Norovirus can persist on common kitchen surfaces for at least 3-6 weeks
- Some hand sanitizers are not effective at reducing norovirus on hands

For more information contact Ben Chapman, bchapman@mcgill.ca or Doug Powell, dipowell@ksu.edu



INTERNATIONAL FOOD SAFETY NETWORK INFOSHEET

FOODSAFETY.KSU.EDU

FOODSAFETYINFOSHEETS.KSU.EDU



ALMOST 40% OF NOROVIRUS OUTBREAKS ARE LINKED TO FOOD SERVICE SETTINGS

August 8, 2008

NOROVIRUSES SPREAD LARGELY THROUGH FOOD CONTAMINATED BY VOMIT OR FECAL MATTER, OR THROUGH CLOSE CONTACT WITH INFECTED PEOPLE



Indagini su epidemie di GE da NoV in cui la “epidemiologia molecolare” ha fornito informazioni sul meccanismo di trasmissione, per la prevenzione e il controllo

Anno	Luogo	Veicolo	Situazione	Novità
1993	Multistato – Lousiana	Ostriche	Epidemia multistato collegata ad ostriche della Lousiana	Sito di coltivazione contaminato da 1 pescatore; sequenze comuni tra i focolai; virus tracciato nelle ostriche
1996	US e Canada	Acqua di pozzo	Epidemie multiple tra turisti USA che si fermavano ad una stazione di bus in Canada	Sequenze comuni tra i diversi casi alla base del tracciamento epidemiologico; primo ritrovamento di NoV nelle acque
1998	Globale	Sconosciuto	Ceppo comune identificato in 6 paesi	Primo ritrovamento di un ceppo epidemico “globale”
1998	Europa e Canada	Lamponi	Epidemia internazionale (5 paesi) legata a lamponi prodotti in Slovenia	Epidemia successiva alla distribuzione di un alimento contaminato
1999	US	“Delicatessen”	Consumatori di un “delicatessen meal”; addetto alla preparazione dell’alimento implicato	Prima identificazione di un alimento contaminato alla superficie; stesso virus nei pazienti



[Display Settings:](#) ☒ Abstract

[Send to:](#) ☐

N Z Med J. 2011 Dec 16;124(1347):63-71.

Two New Zealand outbreaks of norovirus gastroenteritis linked to commercially farmed oysters.

Wall R, Dymond N, Bell A, Thornley C, Buik H, Cumming D, Petersen N.

Population Health, Waikato District Health Board, Hamilton, New Zealand. rwall@hotmail.com

Abstract

AIM: We report on the investigations of two gastroenteritis outbreaks, which were linked to a common source.

METHODS: Retrospective cohort studies were conducted for two gastroenteritis outbreaks which occurred in Auckland and in Waikato. Faecal samples and samples of oyster meat were analysed. Environmental surveys of implicated areas were conducted.

RESULTS: 10 out of 16 people who had eaten at a catered event in Auckland, and 3 out of 15 people who had eaten at a Waikato restaurant, experienced gastroenteritis. The symptoms, duration of illness and incubation periods were consistent with norovirus gastroenteritis in both outbreaks. The consumption of oysters was strongly associated with an increased risk of illness. Faecal samples were positive for norovirus. Oysters from both outbreaks were traced back to the same growing area. Samples of oyster meat from one of the restaurants and from the growing area were positive for norovirus. The growing area was closed for further investigation. A pipe from a waste water treatment plant was later found to be leaking partially treated effluent into a stream discharging near the implicated growing area.

CONCLUSION: Investigation of these two outbreaks led to the discovery of a common source of norovirus at a commercial oyster growing area.

PMID: 22237569 [PubMed - indexed for MEDLINE]



FDA News

FOR IMMEDIATE RELEASE

P07-37

March 2, 2007

Media Inquiries:

Michael Herndon, 301-827-6242

Consumer Inquiries:

1-888-SAFEFOOD

FDA Investigating Norovirus Outbreak Linked to Oysters Consumers Advised To Avoid Raw Oysters Harvested from San Antonio Bay

The U.S. Food and Drug Administration (FDA) is investigating an outbreak of norovirus-associated illness linked to eating raw oysters harvested from San Antonio Bay, TX. FDA advises consumers to avoid eating raw oysters harvested from this area after February 1, 2007, as a result of reports of illnesses in people who attended a Maryland event where these oysters were served. Symptoms of illness associated with norovirus include nausea, vomiting, diarrhea and stomach cramping. Affected individuals often experience low-grade fever, chills, headache, muscle aches and a general sense of tiredness. Most people show symptoms within 48 hours of exposure to the virus. The illness typically lasts one to two days.



At Restaurants and other Foodservice Establishments:

- Order oysters fully cooked.

In the Shell:

- Purchase oysters with the shells closed. Throw away any oysters with shells already opened.

To prepare oysters for eating, choose one of the following methods:

- ➡ Boil oysters until the shells open. Once open, boil for an additional 3-5 minutes.
- Steamer - add oysters to water that is already steaming and cook live oysters until the shells open; once open steam for another 4-9 minutes.
- Use smaller pots to boil or steam oysters. Using larger pots, or cooking too many oysters at one time, may cause uneven heat distribution, which may cause the oysters in the middle to not get fully cooked.
- Discard any oysters that do not open during cooking.

Shucked Oysters:

To prepare oysters for eating, choose one of the following methods:

- ➡ Boil or simmer shucked oysters for at least 3 minutes or until the edges curl.
- Fry at 375 degrees for at least 3 minutes.
- Broil 3 inches from heat for 3 minutes.
- Bake at 450 degrees for 10 minutes.

For further information contact:

FDA Food Safety Hotline: 1-888-SAFEFOOD

FDA website: www.cfsan.fda.gov



Table 1. Etiological agents and cases of shellfish-borne infectious diseases in the United States.

Agent	No. of cases (% of total)	
	1894–1990 ^a	1991–1998 ^b
Norwalk and Norwalk-like viruses	427 (3)	1122 (52)
<i>Vibrio parahaemolyticus</i>	159 (1)	631 (29)
<i>Vibrio vulnificus</i>	160 (1)	179 (8)
Unidentified ^c	7978 (56)	144 (7)
<i>Salmonella typhi</i>	3270 (23)	0 (0)
Hepatitis A virus	1798 (13)	5 (<1)
<i>Salmonella</i> species (other than <i>typhi</i>)	130 (<1)	4 (<1)
<i>Shigella</i> species	111 (<1)	4 (<1)
<i>Vibrio cholera</i> non-01	143 (1)	27 (1)
<i>Vibrio cholera</i> 01	14 (<1)	5 (<1)
<i>Vibrio</i> species (others) ^d	49 (<1)	26 (1)
Hepatitis ^e	47 (<1)	0 (0)
Other bacterial pathogens ^f	63 (<1)	15 (1)
Total	14,349 (100)	2162 (100)

^a Data compiled from Besser SE [21]

NoV tra i grandi chef

Heston Blumenthal | Invito a cena *dopo* il delitto

Scritto da: **Antonio Tomace** sabato 26 settembre 2009 12:23



Toh, chi si rivede: Heston Blumenthal, l'enfant terrible della cucina inglese, per la prima volta **chiede scusa** ai clienti intossicati e per farlo aspetta l'uscita del rapporto dell'Health Protection Agency. Per chi si fosse perso qualche passaggio della storia, ricordiamo che il suo ristorante Fat Duck fu **chiuso** dalle autorità nel Marzo scorso perché contaminato dal Norovirus che provocò diarrea, vomito e febbre tra coloro che avevano consumato ostriche. Blumenthal si dichiara "dispiaciuto e frustrato di quanto accaduto" e, a parziale risarcimento del danno, invita i clienti colpiti dal virus ad una sorta di cena riparatrice, da tenersi a loro piacimento e completamente gratuita. Non una parola però sul colpevole ritardo con cui ha allertato l'HPA e sul rapporto dell'Ente inglese che parla di una errata

manipolazione dei frutti di mare e di pratiche igieniche insufficienti. Insomma, Blumenthal come una Brambilla qualsiasi alle prese coi turisti giapponesi del **Passetto**, offre da bere a tutti e scurdamnece 'o passato, ma mettiamo il caso che voi siate tra i fortunati che hanno pasteggiato a ostriche e norovirus, accettereste l'invito?

CERCA

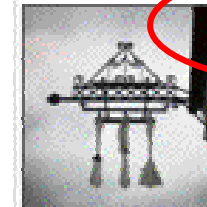
Post collegati



I clienti del Fat Duck sono stati avvelenati da frutti di mare contaminati

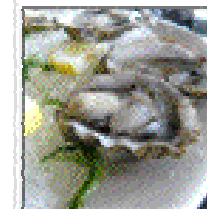
Ieri, un rapporto della HPA (Health Protection Agency) ha addebitato...

[continua »](#)



Fat Duck: chiuso per Norovirus

Heston Blumenthal, uno dei cuochi più celebri del mondo, ha... [continua »](#)



E' possibile mangiare frutti di mare e sopravvivere?

Se come me, anche voi apprezzate le ostriche con un... [continua »](#)

Misure preventive inefficienti ...

OUTBREAK AT CELEBRITY CHEF'S RESTAURANT CAUSED BY NOROVIRUS

REPORT: STAFF AT FAT DUCK WERE ILL



Stay out of the kitchen if you are sick

What you can do...

- Always wash your hands after using the restroom.
- Call in sick when you are ill with diarrhea or vomiting.

Norovirus facts

- Public vomiting is particularly a problem as the act of spewing can cause particles to spread.
- Pathogens can be passed on by someone even if they aren't feeling ill.
- Norovirus can stay viable on surfaces for weeks.

The Fat Duck, UK celebrity chef Heston Blumenthal's top restaurant, has recently been linked to an outbreak of foodborne illness. Investigators probing the outbreak are focusing on staff infected by norovirus, also known as the winter vomiting bug.

Reports suggest that 16 of the celebrity chef's staff were struck by norovirus. The restaurant was closed for almost two weeks beginning in late February.

Four hundred people complained of illness after visiting the Michelin-starred venue in Bray, Berkshire, UK. The restaurant has been deep-cleaned, including anti-viral treatments for the walls, furnishings and carpets.



The Fat Duck
Heston Blumenthal

...e misure più efficienti

If you're sick, stay at home

POSTED ON NOVEMBER 21, 2007 BY DOUG POWELL



"In this outbreak, vomiting by a line cook at the work station might have contributed to transmission ... Because of the open physical layout of the restaurant, no barrier impeded airborne spread of the virus from the kitchen to the main dining area."

Or so concludes the **U.S. Centers for Disease Control** in its write-up of a Jan. 2006 norovirus outbreak in Michigan (it was a Carrabba's Italian Grill in Lansing, Mich.) in which *"at least 364 restaurant patrons became ill with gastroenteritis after*

dining at a restaurant where employees had reported to work while ill."

At the time of the outbreak, a food service employee in Lansing wrote that, *"What happened at Carrabba's could occur at any of our local eateries. Not because their kitchens are not clean, not because they don't follow all of the safety standards, but because sick employees report to work. There is an internal peer pressure to report to work even when you are ill, not to mention that a day without pay can be crucial for some families."*

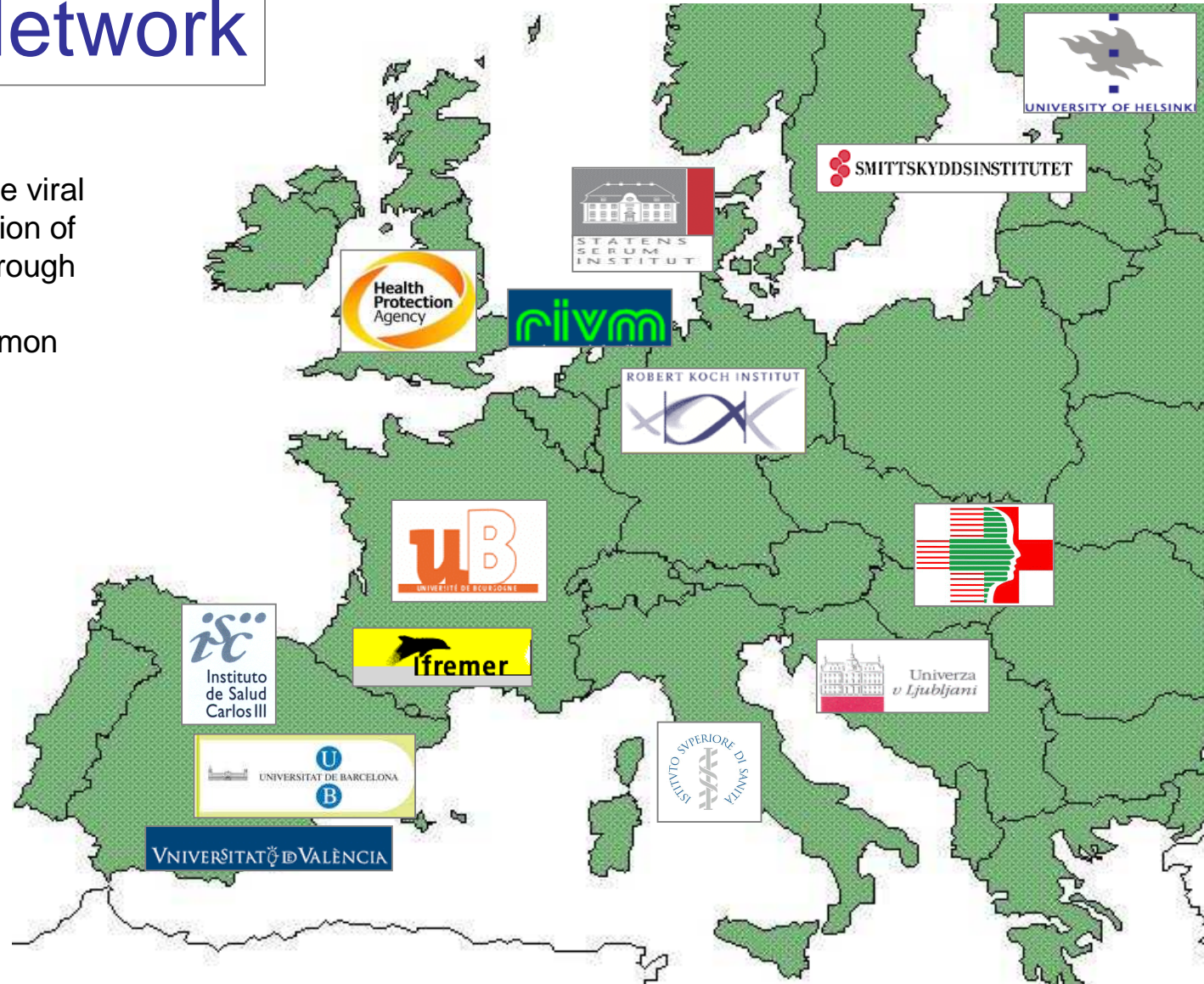
CARATTERISTICHE DEI NOROVIRUS IMPORTANTI AI FINI DELLA PREVENZIONE

Carattere	Osservazione	Conseguenza
Bassa dose infettante	$<10^2$ particelle virali	Trasmissione per droplets, persona/persona, secondaria
Escrezione asintomatica prolungata	Fino a 2 settimane?	Rischio di infezione secondaria, controllo degli addetti agli alimenti
Stabilità ambientale	10 ppm Cl [*] , stabile al congelamento e a 60°C	Difficile da eliminare dall'acqua contaminata; si conserva nel ghiaccio e frutti di mare poco cotti
Grande diversità tra i ceppi	Molti tipi genetici e antigenici (?)	Diagnosi di laboratorio complessa; episodi dovuti a ceppi virali multipli
Mancanza di immunità di lungo periodo	Infezioni sintomatiche ripetute	Esposizione pregressa da bambino non protegge gli adulti
Reservoir	Uomo / animali ?	Recente identificazione di ceppi simili negli animali



FBVE Network

Rapid detection of transnational foodborne viral infections and elucidation of transmission routes through molecular tracing and development of a common database



A research proposal on “Quality of Life and Management of Living Resources”
(1999/C 64/14)

Dipartimento di Sanità pubblica veterinaria e sicurezza alimentare

FBVE (“Food-Borne Viruses in Europe”)

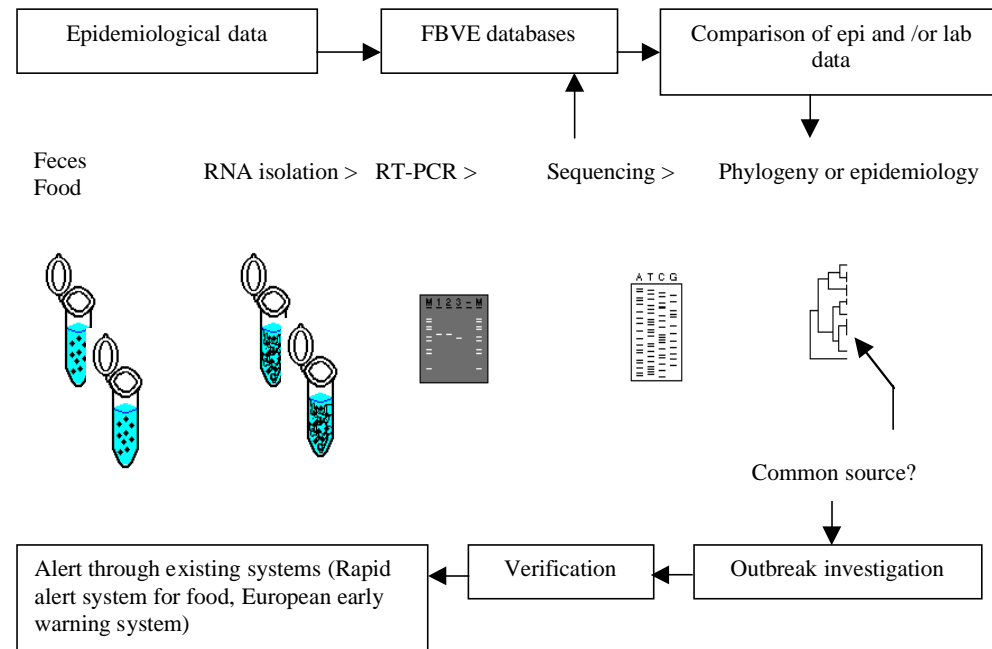


Scopo:

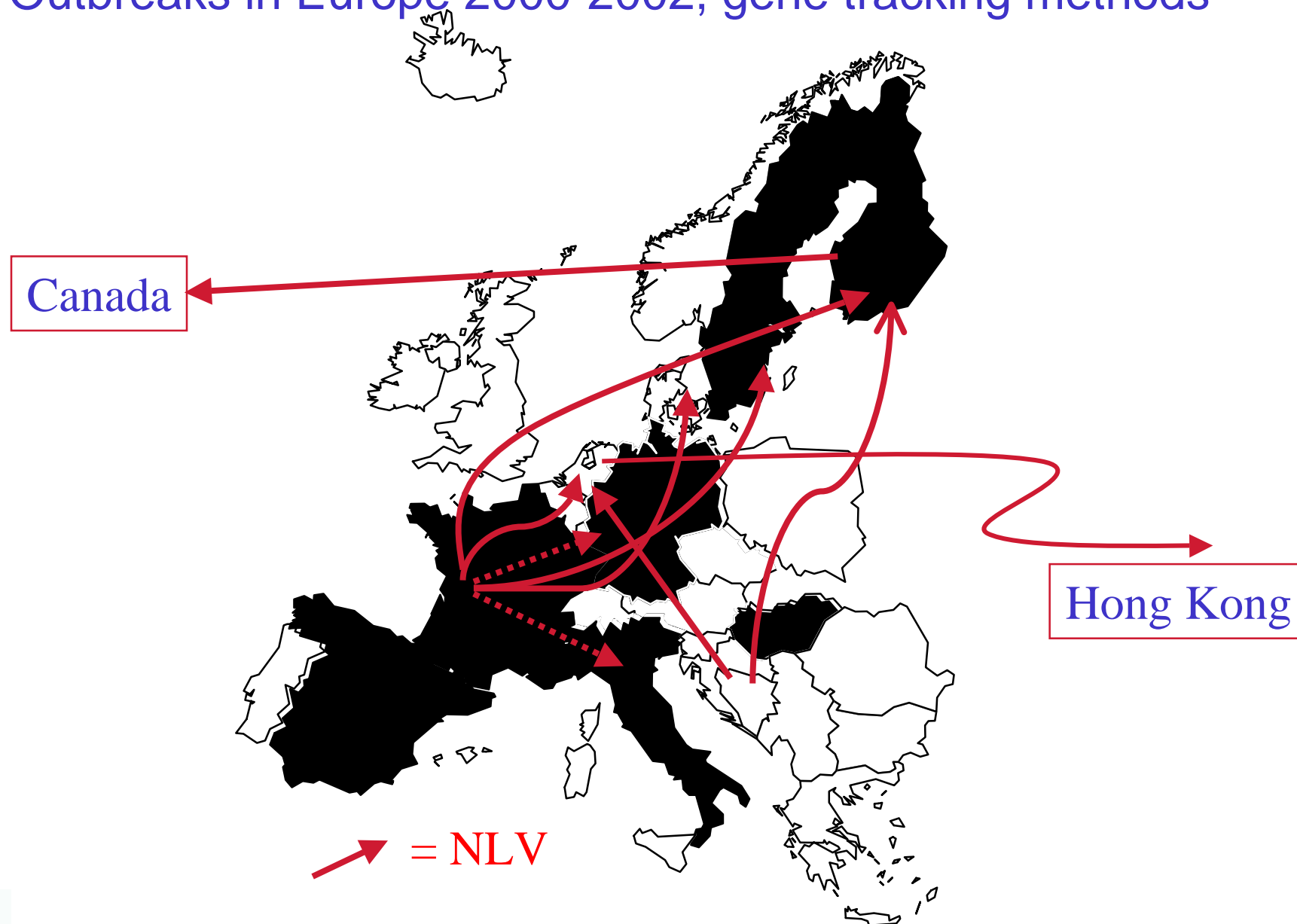
- ◆ individuare epidemie virali veicolate dal consumo di alimenti infetti e chiarire le possibili vie di trasmissione.

Studio delle epidemie:

- ◆ Confronto dati epidemiologici e virologici (lab)
- ◆ Costruzione di un database



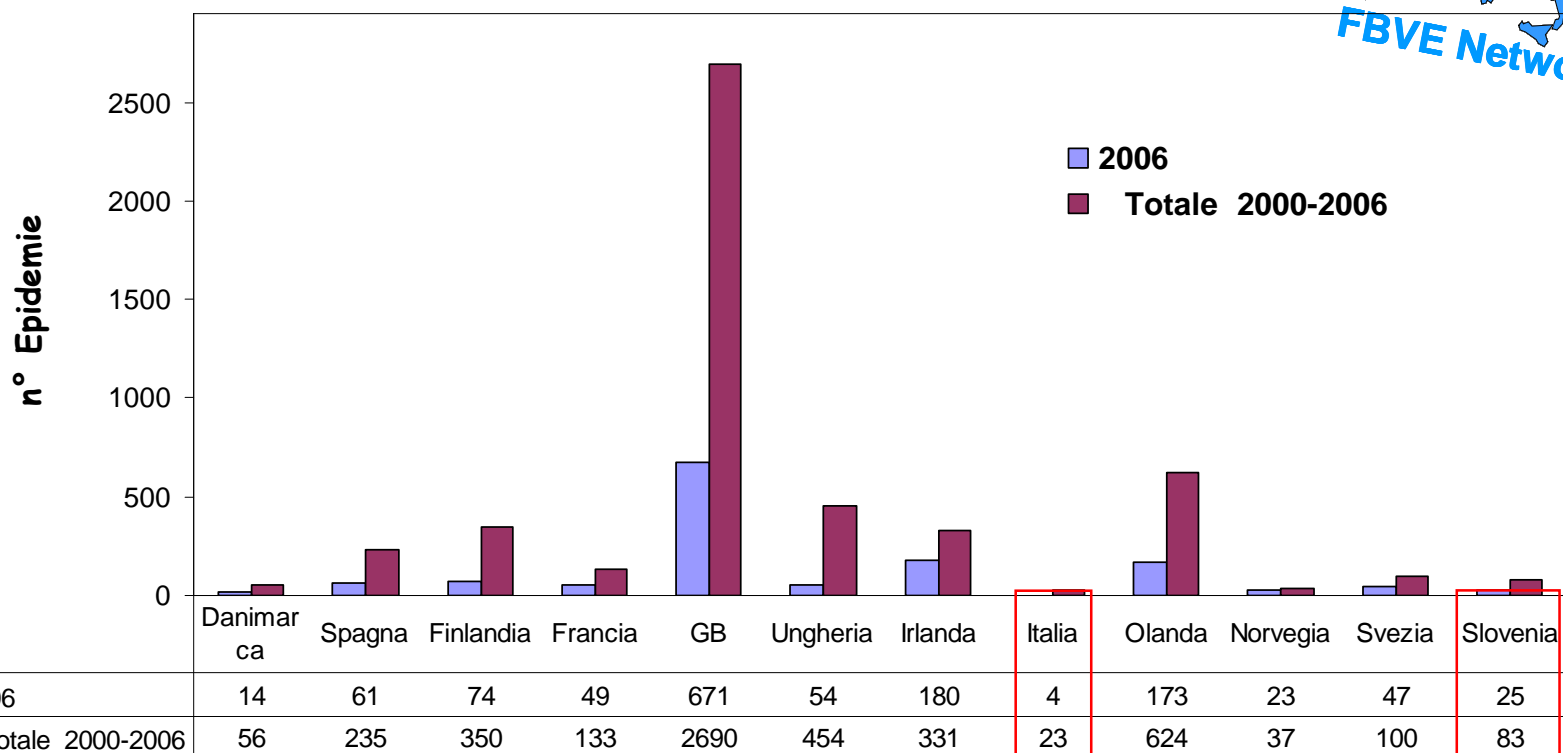
Outbreaks in Europe 2000-2002, gene tracking methods



Epidemie causate da Norovirus FBVE ("Food-Borne Viruses in Europe")



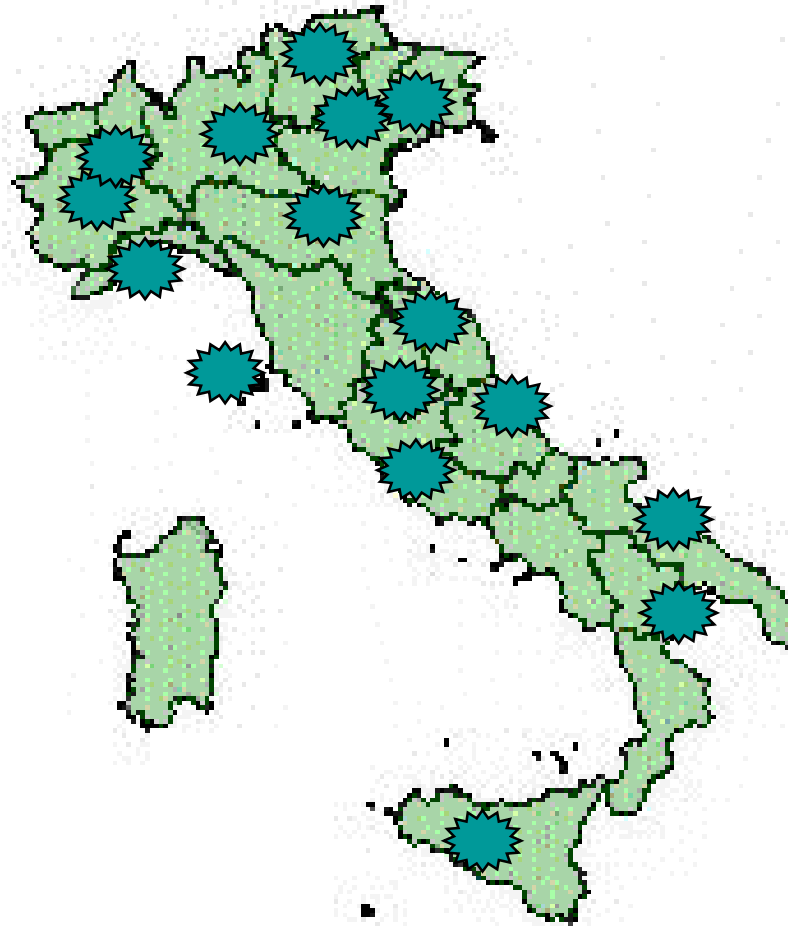
Epidemie GE Norovirus



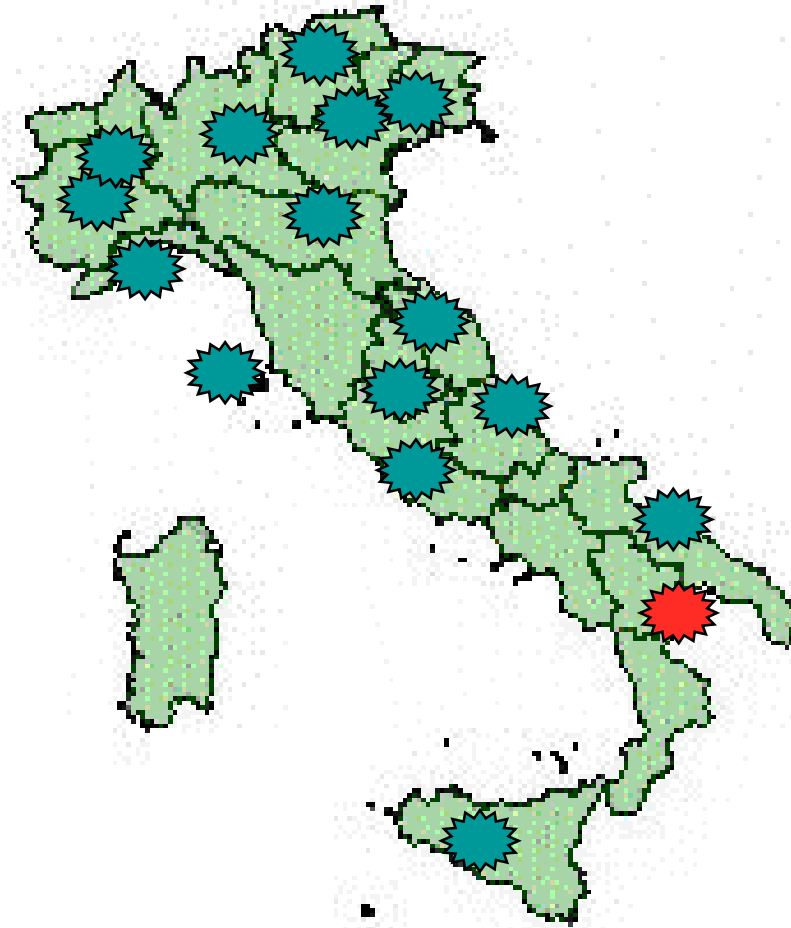
Paesi EU (FBVE)



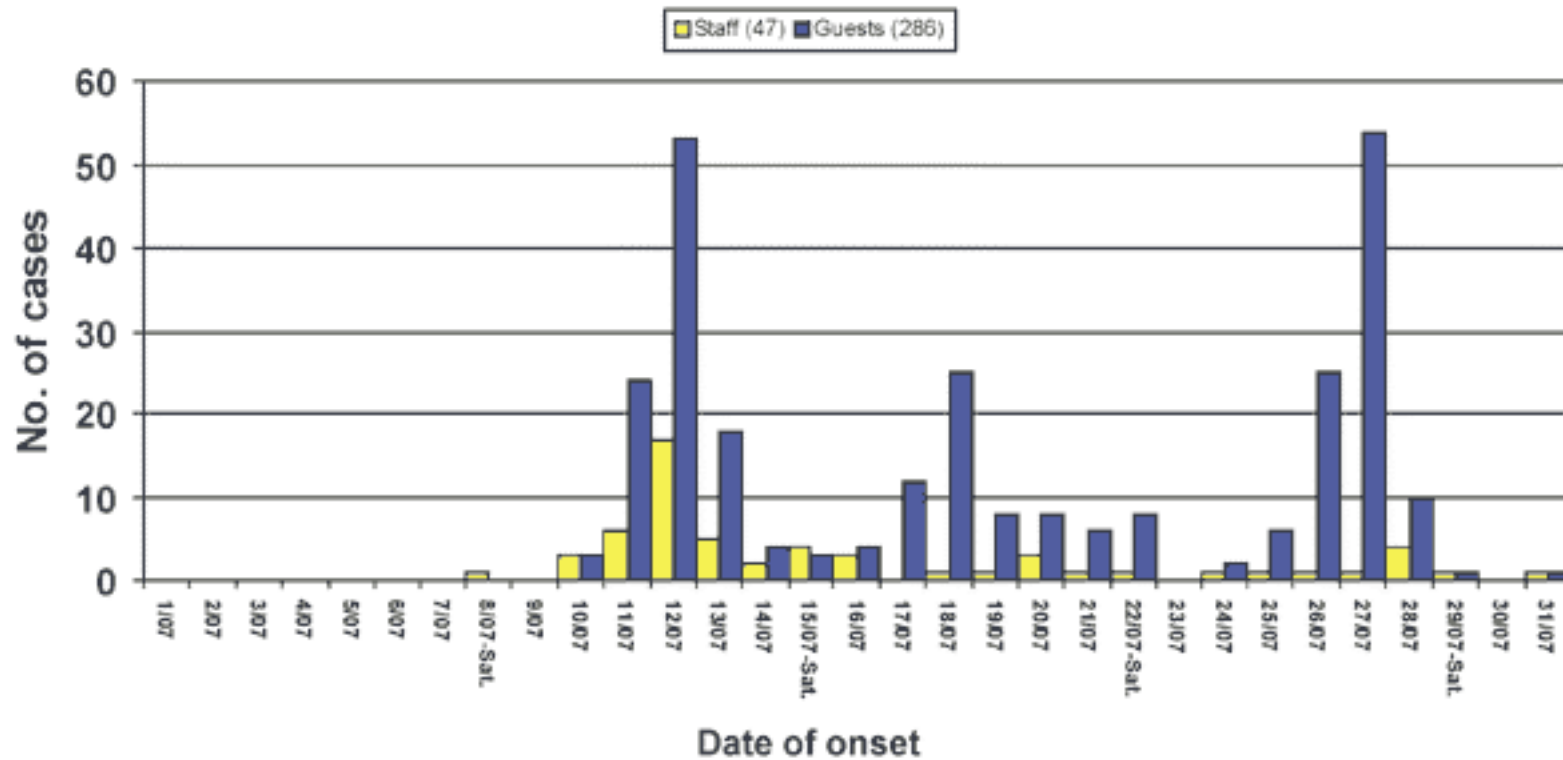
Norovirus outbreaks in Italy



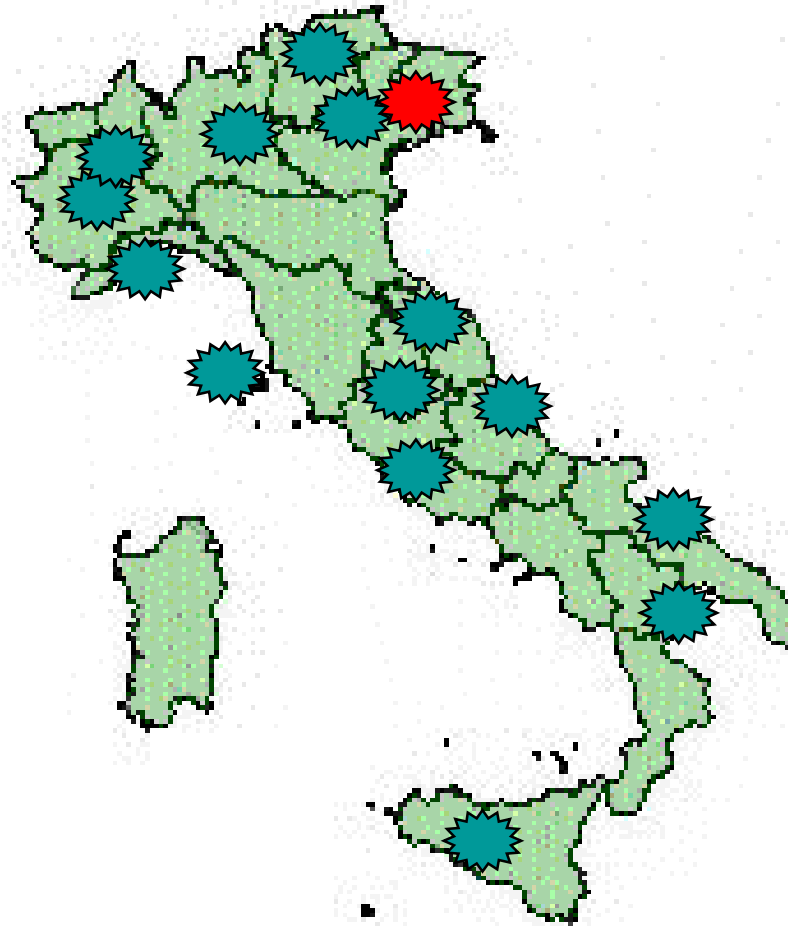
Scanzano J. (PZ), 2000



Waterborne Outbreak of Norwalk-Like Virus Gastroenteritis at a Tourist Resort, Italy



Palmanova (UD), 2005



Provincia di Udine - dicembre 2005



- 16 - 18 dicembre 2005
- 440 persone partecipanti a pranzi e cene prenatalizie organizzate da aziende e gruppi sociali

L. Gallo - Profea Roma, 13 ottobre 2006



INDAGINE EPIDEMIOLOGICA

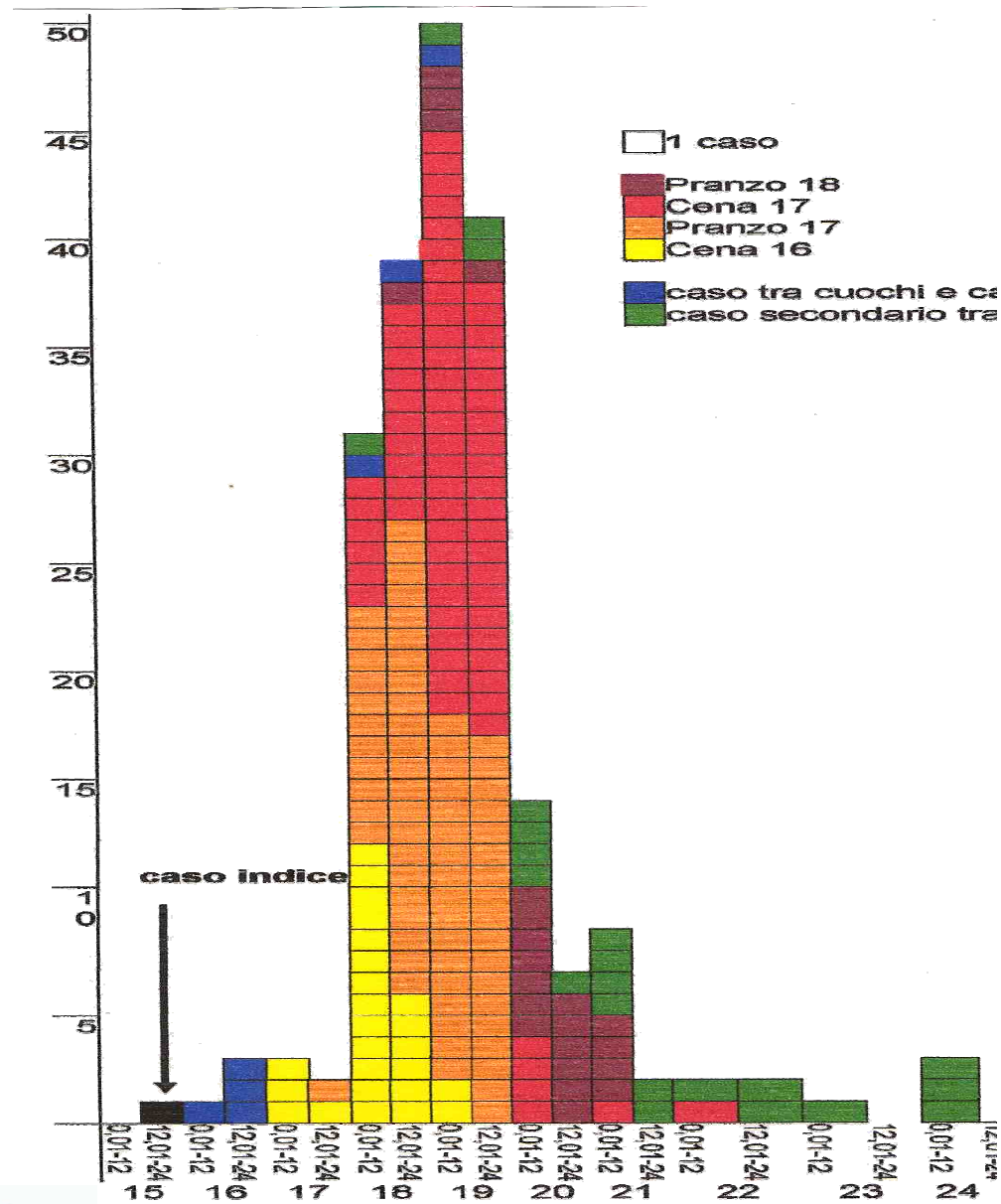
Esposizione	% Casi (n)		RRc	RRadj
	Mangiato	Non mangiato		
antipasto pesce gratinato	64% (167)	42% (15)	1,5	==
frittura	81% (90)	50% (92)	1,6	1,3
grigliata di pesce	70% (155)	36% (26)	1,9	==
“volpina”	79% (130)	94% (53)	2,0	1,5
antipasto di pesce freddo	70% (176)	14% (6)	5,1	3,4



INDAGINI VIROLOGICHE

- Feci di 14 persone coinvolte nell'epidemia positive per norovirus (un unico ceppo virale di genotipo GII.6)
- 1 tampone ambientale positivo per norovirus
(piano di lavoro per la pulitura dei mitili e la preparazione di antipasti di pesce)





Ispezione nel ristorante
Cuochi, camerieri (n=15) intervistati:
6 sintomatici

296 intervistati (67%)

Casi: 182 AR=62%

Il 15 dicembre: la figlia del gestore
(3 anni) presenta disturbi
gastrointestinali con vomito
(caso indice)

T. Gallo; M. Zuliani

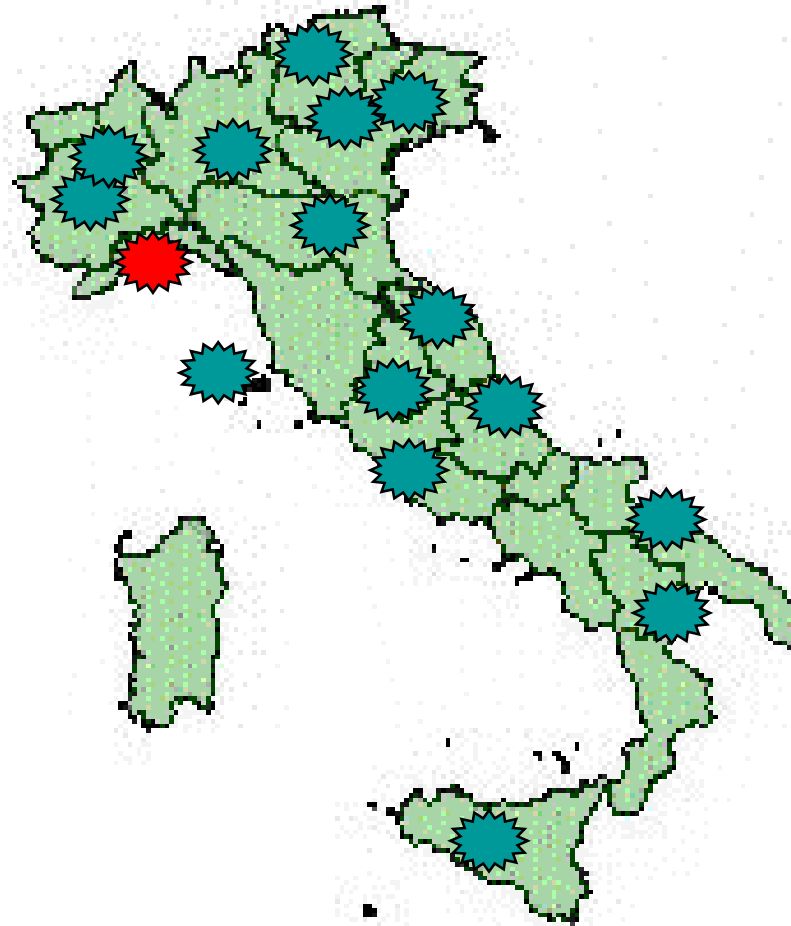
LA SPEZIA OUTBREAK, 2002

AUSL 6 La Spezia:

- 202 cases of GE between December 25-28
- Strong association with consumption of oysters
- High secondary attack rates

41 stools collected
9 stools NoV - pos

4 NoV genotypes



THAU OUTBREAKS, 2002

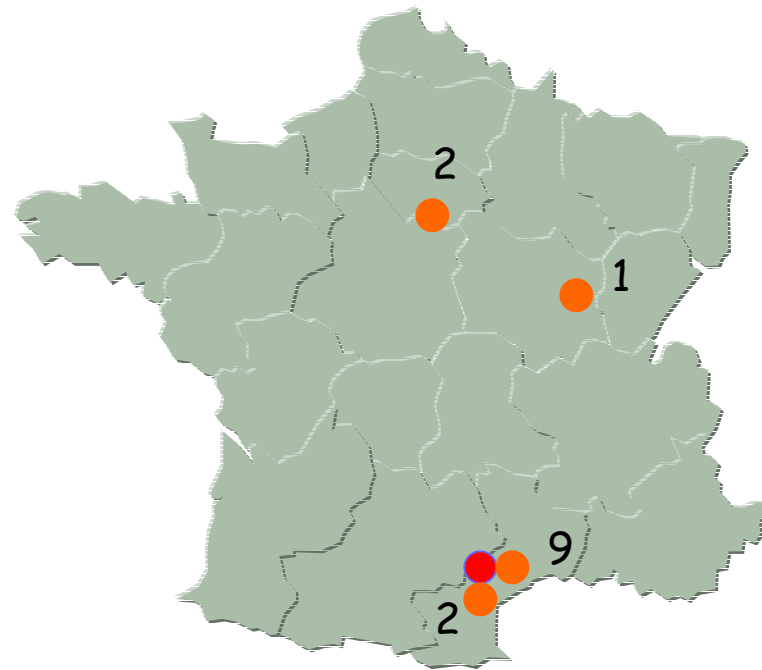
- Setting: private houses and reception
- 14 foodborne outbreaks declared all over France ●
- 90 sick people in France
- Transmission: oysters
- Origin: pond of Thau ●

12 stools

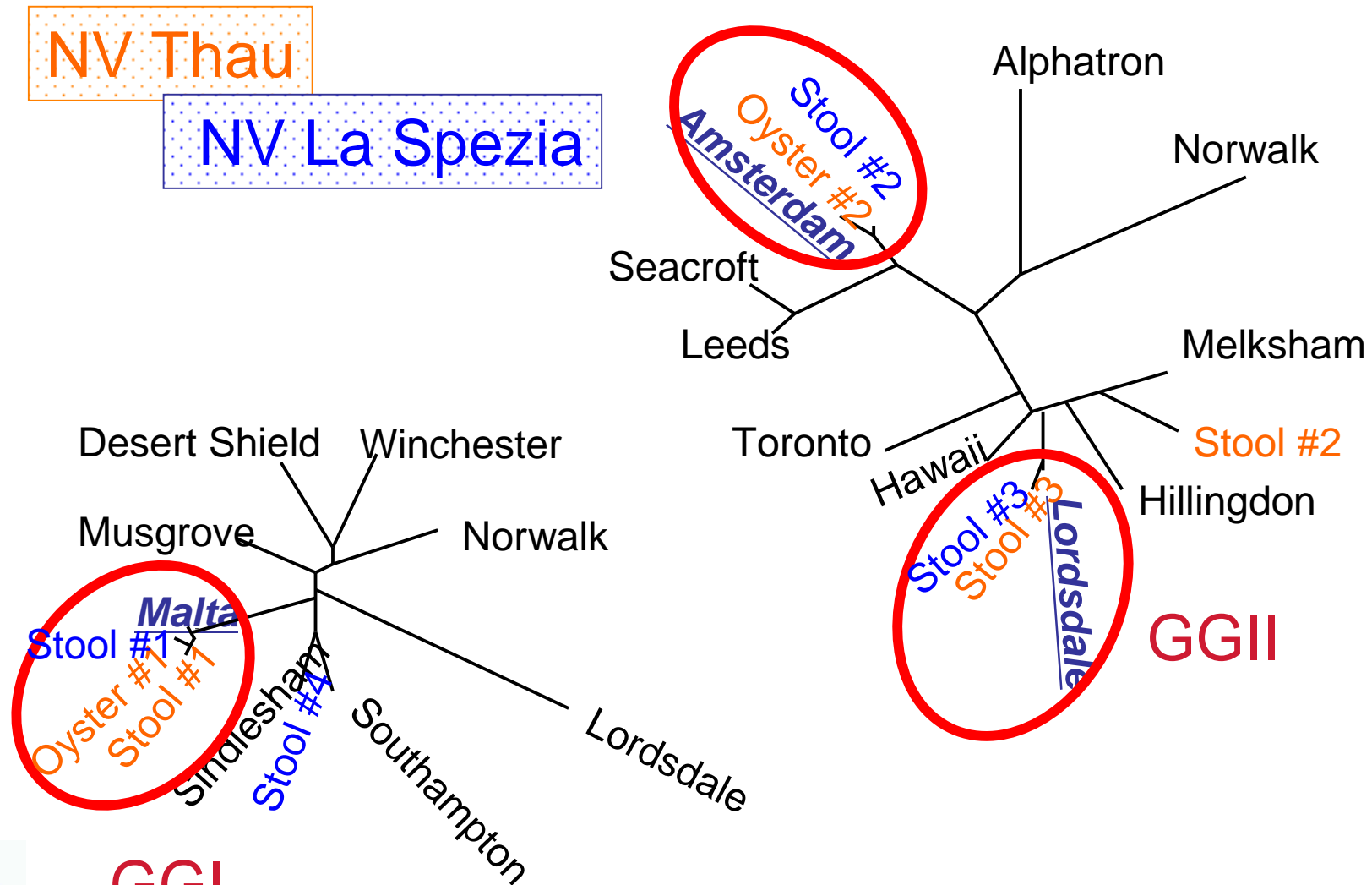
3 NoV genotypes

Oysters

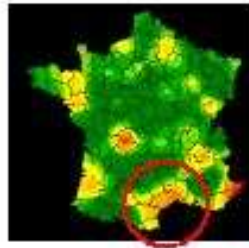
2 NoV genotypes



MOLECULAR COMPARISON OF NoVs

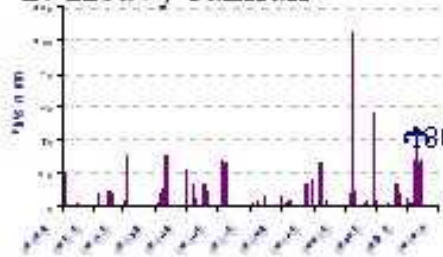


1. Gastroenteritis outbreak

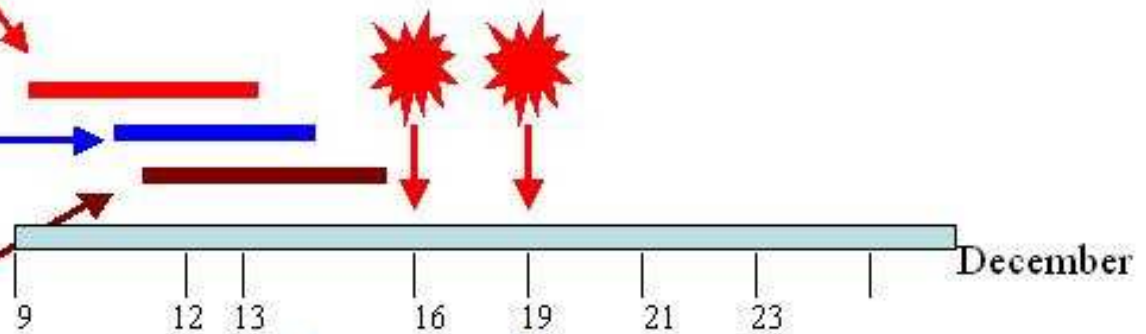


December events leading to shellfish contamination.

2. Heavy rainfall



Shellfish alert based on *E. coli*



3. STP failure



Oysters send to French or Italian market



Cases in the population

- ✓ Epidemie causate da alimenti:
 - Contaminazione primaria (es. La Spezia)
 - Contaminazione secondaria- manipolazione (es. Udine)

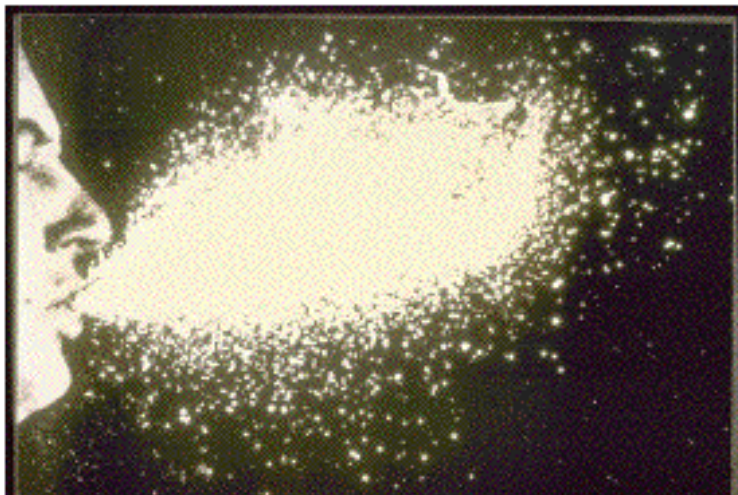
- ✓ In Italia non esiste un sistema di notifica adeguato, la maggior parte delle GE causate da Norovirus non vengono identificate

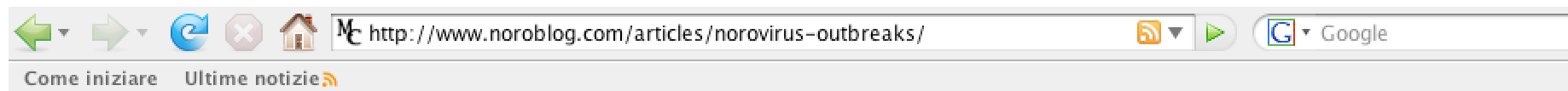
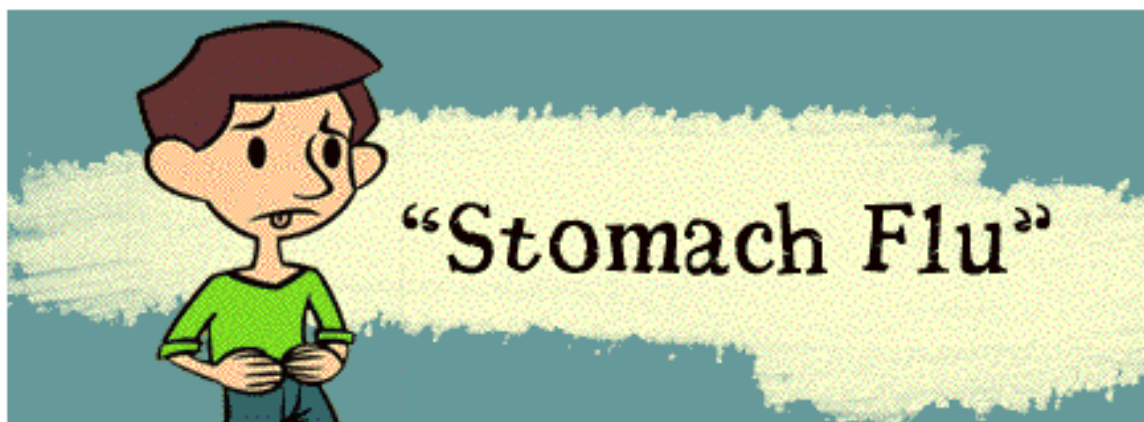


Igiene delle mani: Flu come ... NoV



Trasmissione aerea: NoV ... come ... flu

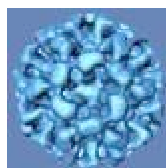




'Stomach flu' virus affects area nursing home

Posted on May 22, 2007 by Norovirus Lawyer

Health officials believe that a nursing home in Washington, North Carolina has been struck by a *Norovirus* outbreak. The *Norovirus* is highly contagious and usually persists for 24 to 60 hours. [Full Story from the Washington Daily Press](#)



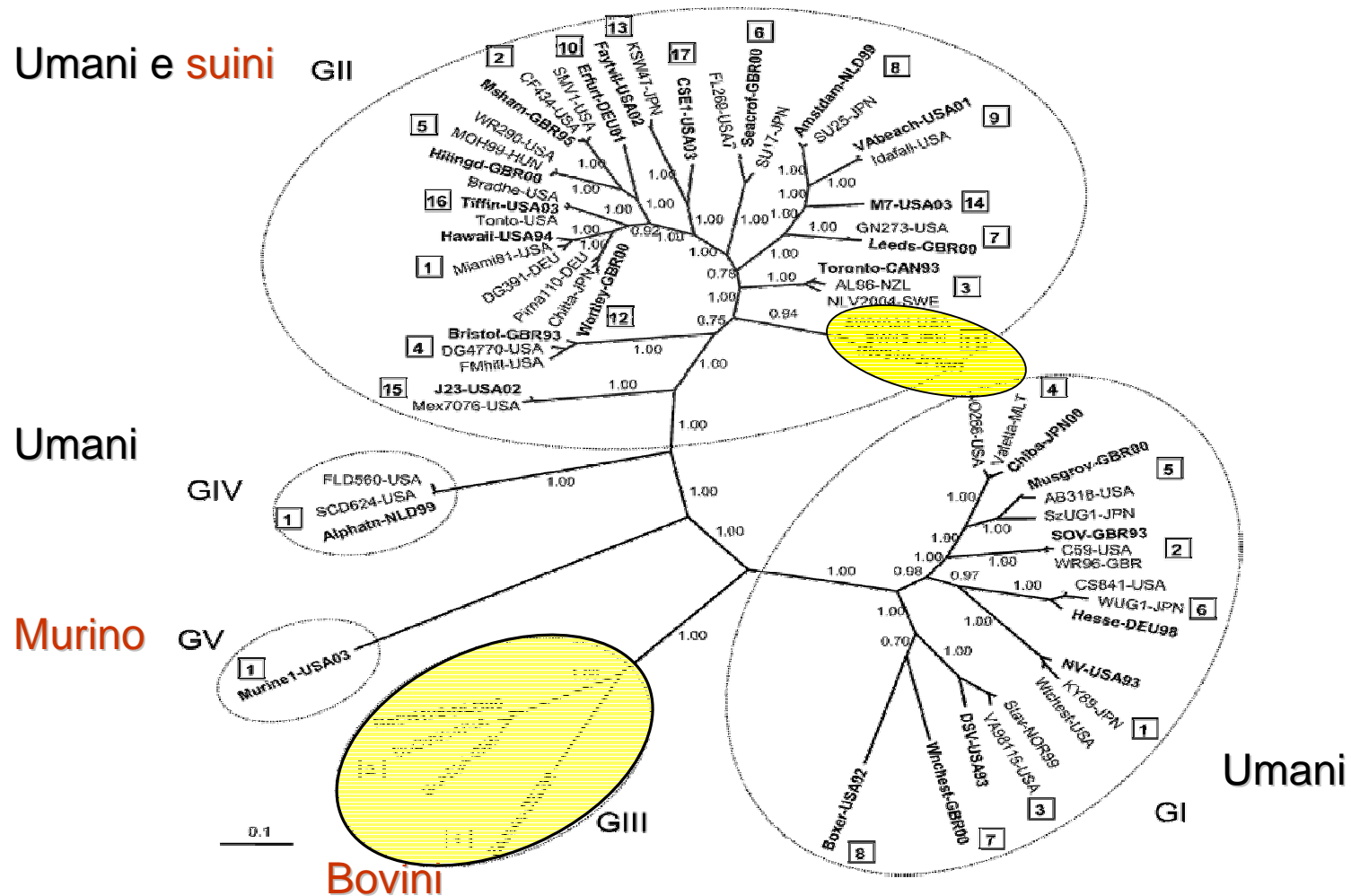
About 15 to 20 residents at Ridgewood Manor have experienced the symptoms over the course of about a week, according to different estimates from the nursing home and the Beaufort County Health Department.

Il momento d'oro dei virus



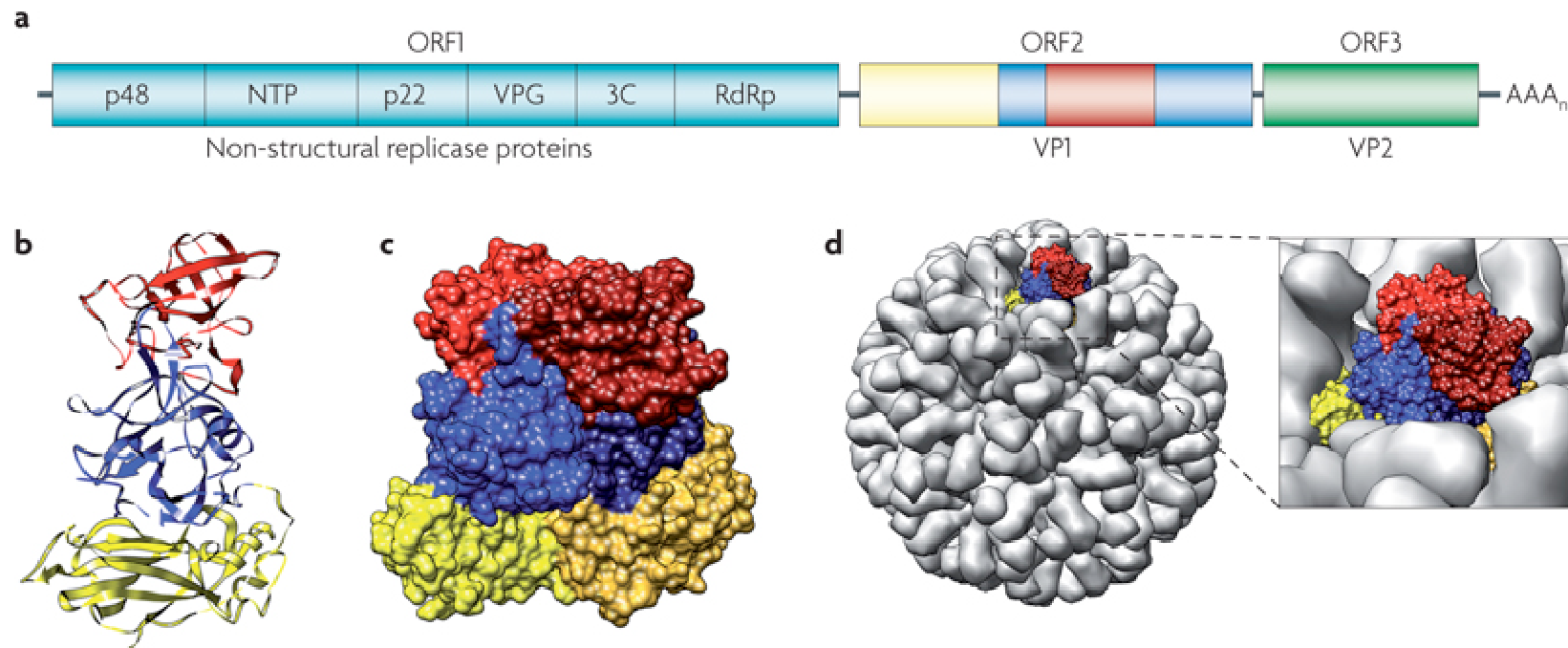
FILOGENESI DEI NOROVIRUS

Elevata variabilità; classificati in 5 genogruppi



Viral shape-shifting: norovirus evasion of the human immune system

Eric F. Donaldson, Lisa C. Lindesmith, Anna D. LoBue and Ralph S. Baric



Norovirus Gastroenteritis, Carbohydrate Receptors, and Animal Models

Ming Tan, Xi Jiang*

August 2010 | Volume 6 | | PLOS PATHOGENS

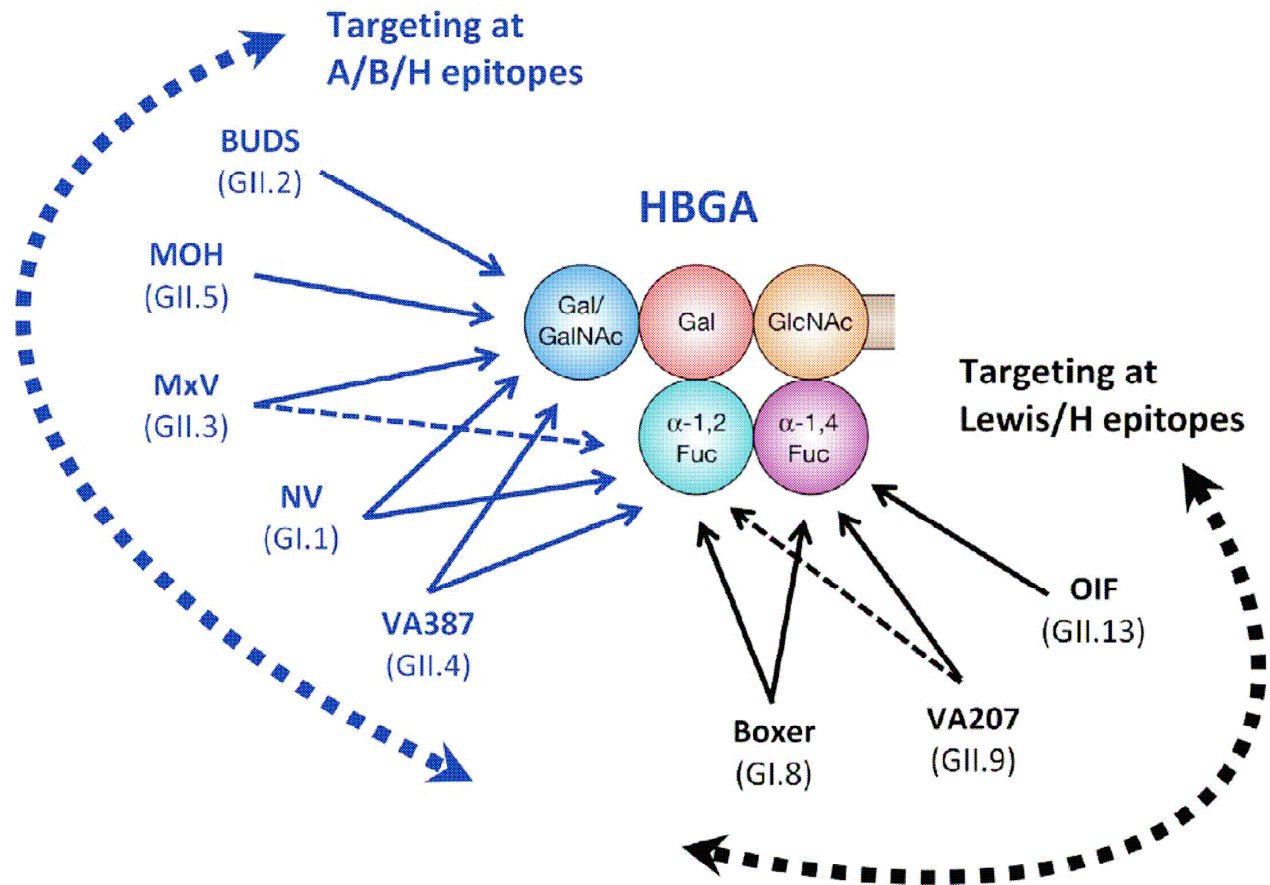
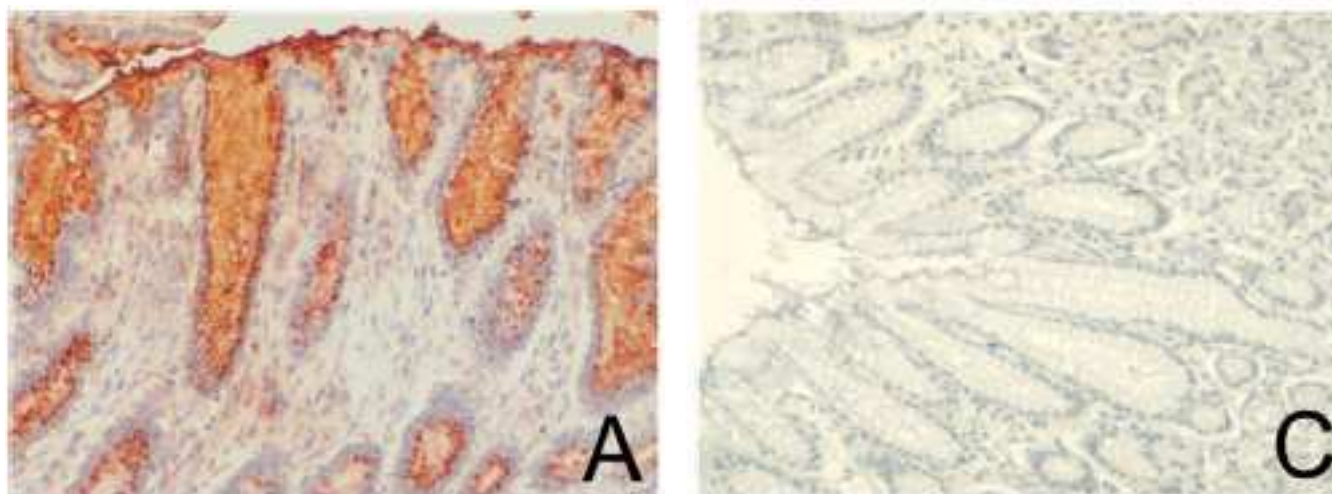


Figure 2. Schematic interactions and relationships among different human noroviruses with a complete product of human HBGA.

Bovine Norovirus: Carbohydrate Ligand, Environmental Contamination, and Potential Cross-Species Transmission via Oysters^{▽†}

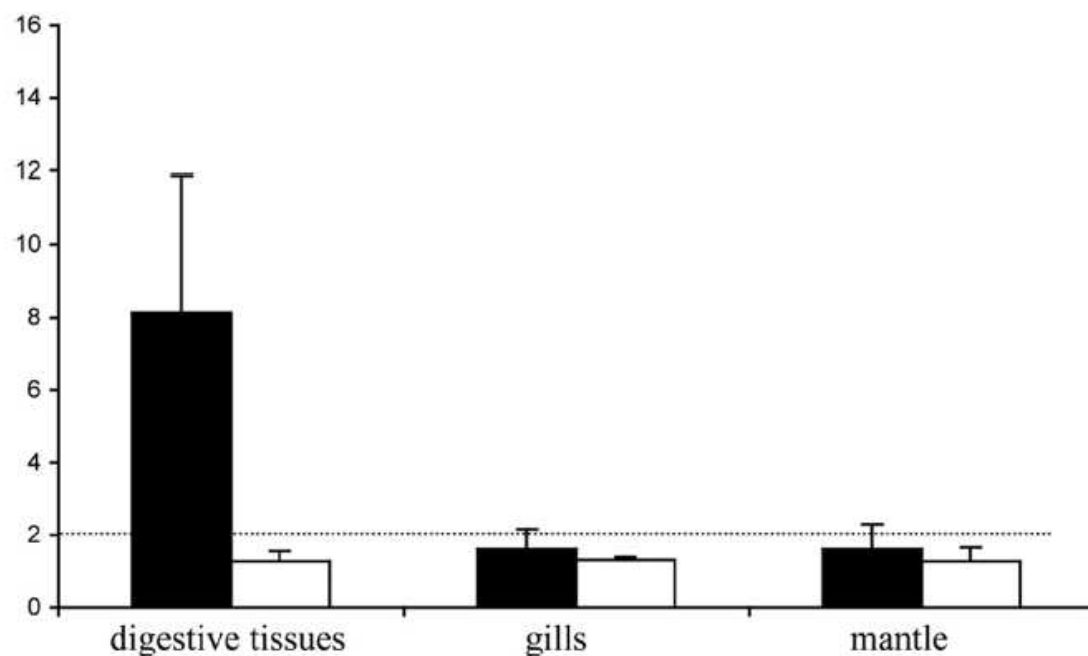
Maha Zakhour,¹ Haifa Maalouf,² Ilaria Di Bartolo,³ Larissa Haugarreau,² Françoise S. Le Guyader,²
Nathalie Ruvoën-Clouet,^{1,4} Jean-Claude Le Saux,² Franco Maria Ruggeri,³
Monique Pommepuy,² and Jacques Le Pendu^{1*}



GIII.2 BEC28 VLPs recognize the α -Gal epitope ($\text{Gal}\alpha 3\text{Gal}\beta 4\text{GlcNAc}$) expressed on surface epithelial cells of bovine (A) but not human (C) stomach and duodenum

Bovine Norovirus: Carbohydrate Ligand, Environmental Contamination, and Potential Cross-Species Transmission via Oysters^{▽†}

Maha Zakhour,¹ Haifa Maalouf,² Ilaria Di Bartolo,³ Larissa Haugarreau,² Françoise S. Le Guyader,² Nathalie Ruvoën-Clouet,^{1,4} Jean-Claude Le Saux,² Franco Maria Ruggeri,³ Monique Pommepuy,² and Jacques Le Pendu^{1*}



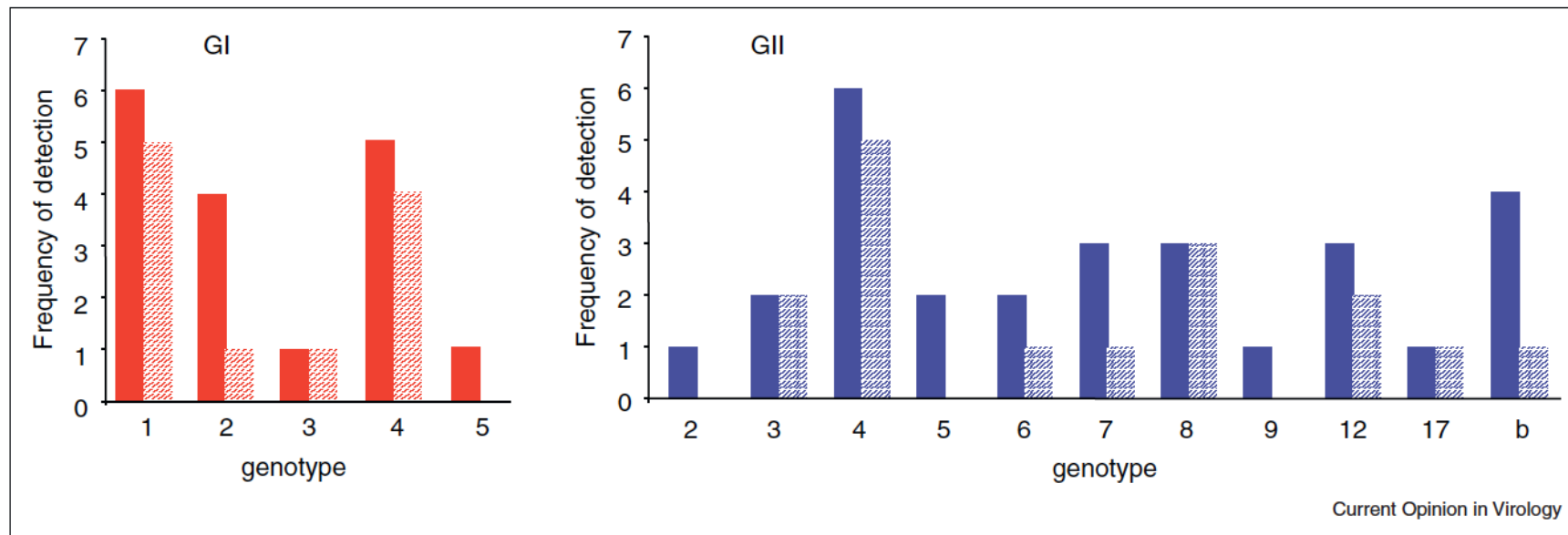
GI.1 HuNoV but not GIII.2 BoNoV VLPs bind cells of digestive tissues of oysters



AEM, 2010, 76: 6404–11

NoV genotypes in human feces vs. shellfish

Figure 1



Genotype frequency in stool and shellfish samples. NoV GI (red) and GII (blue) genotype detected in stool (plain bar) and shellfish (striped bar) samples.



Françoise S Le Guyader¹, Robert L Atmar² and Jacques Le Pendu³

Current Opinion in Virology 2012, 2:103–110

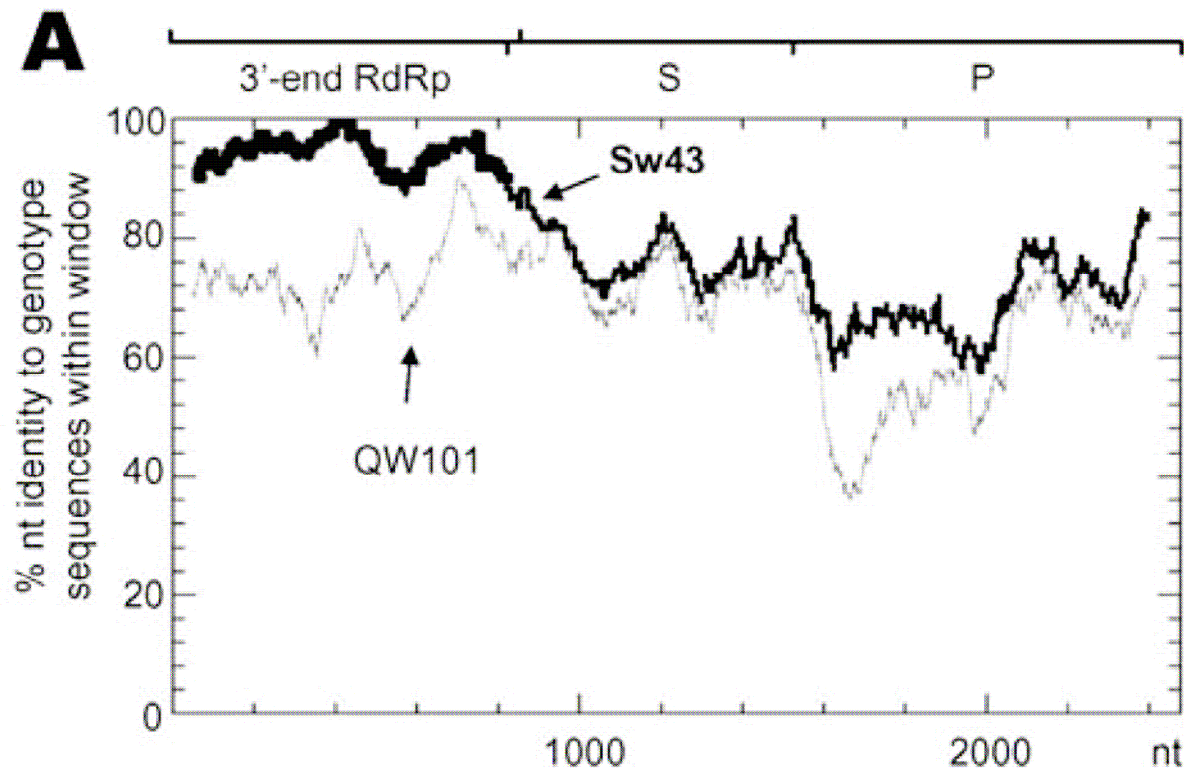
Dipartimento di Sanità pubblica veterinaria e sicurezza alimentare

Foodborne / Zoonotic NoVs



Porcine Noroviruses Related to Human Noroviruses

Qiu-Hong Wang,* Myung Guk Han,* Sonia Cheetham,* Menira Souza,* Julie A. Funk,† and Linda J. Saif*



Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 11, No. 12, December 2005

Dipartimento di Sanità pubblica veterinaria e sicurezza alimentare



JOURNAL OF VIROLOGY, Nov. 2006, p. 10372–10381
0022-538X/06/\$08.00+0 doi:10.1128/JVI.00809-06
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Vol. 80, No. 21

Pathogenesis of a Genogroup II Human Norovirus in Gnotobiotic Pigs

Sonia Cheetham,¹ Menira Souza,¹ Tea Meulia,² Sheila Grimes,³ Myung Guk Han,¹ and Linda J. Saif^{1*}

APPLIED AND ENVIRONMENTAL MICROBIOLOGY, Mar. 2006, p. 1800–1809
0099-2240/06/\$08.00+0 doi:10.1128/AEM.72.3.1800–1809.2006
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Vol. 72, No. 3

Human and Animal Enteric Caliciviruses in Oysters from Different Coastal Regions of the United States

Veronica Costantini,¹ Fabienne Loisy,² Lynn Joens,³ Françoise S. Le Guyader,² and Linda J. Saif^{1*}



ORIGINAL ARTICLE

Surveillance of hepatitis A and E viruses contamination in shellfish in Thailand

A. Namsai¹, S. Louisiroatchanakul¹, N. Wongchinda², U. Siripanyaphinyo³, P. Virulhakul⁴, P. Puthavathana¹, K.S. Myint⁵, M. Gannarong⁶ and R. Ittapong²

Conclusion: Significant contamination of HAV in edible bivalve shellfish was observed. Beside digestive tissue, gills are one of the important samples for viral genome detection. All the shellfish were negative for HEV.



ACUTE VIRAL HEPATITIS IN ITALY

(Integrated epidemiological surveillance of acute viral hepatitis - SEIEVA, ISS, 1997-2004)

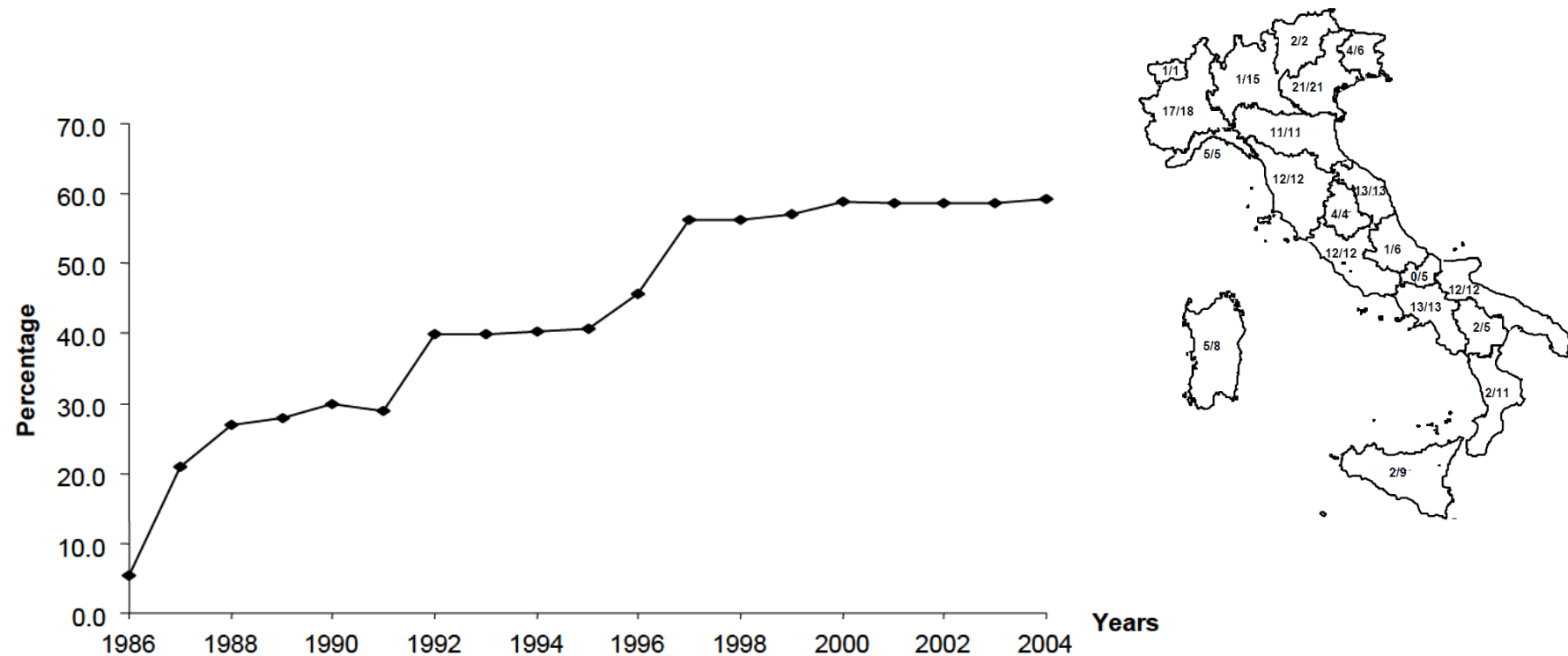


Figure 1. Percentage of Italian population covered by surveillance in Italy. SEIEVA 1986-2004



Hepatitis A in Puglia (South Italy) after 10 years of universal vaccination: need for strict monitoring and catch-up vaccination

BMC Infectious Diseases 2012, **12**:271 doi:10.1186/1471-2334-12-271

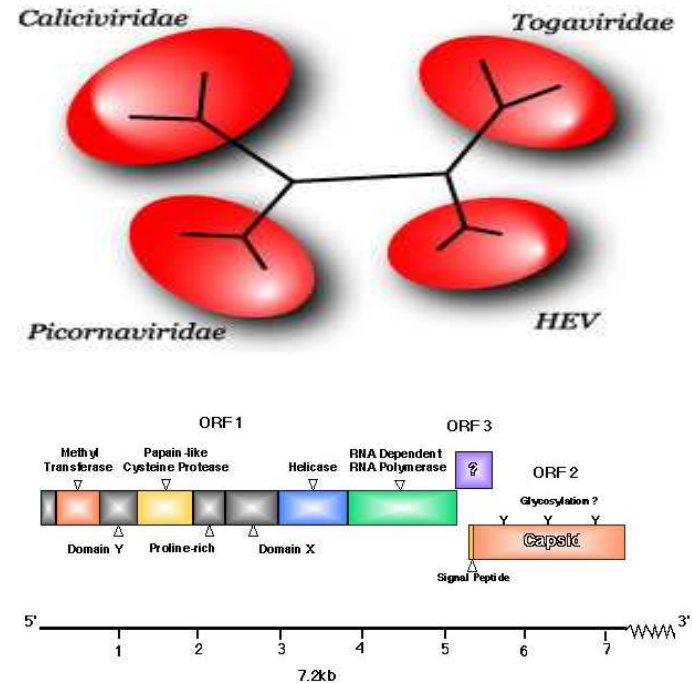
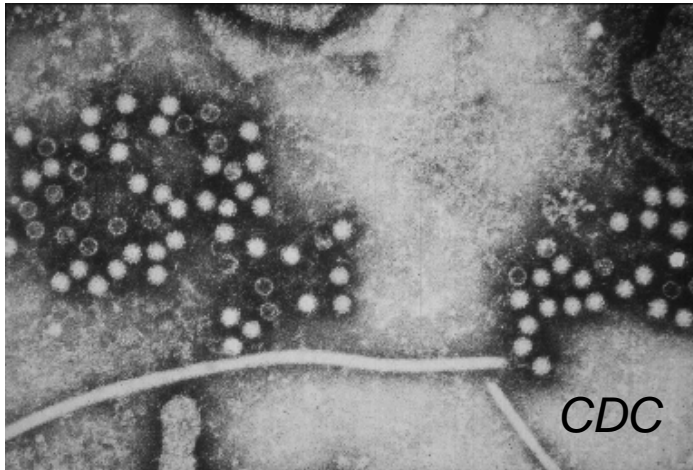
Maria Chironna (m.chironna@igiene.uniba.it)

Table 2 Frequencies and odds ratio of risk factors by acute hepatitis A cases and controls (hepatitis B and C cases occurred in 2008–2009)

Risk factors	Hepatitis A	Controls (hepatitis B and C)	OR	95% CI
Contact with a jaundice case	1 (1%)	0 (0%)	-	-
Shellfish consumption	83 (85%)	4 (23%)	19.2	4.8-83.2
Raw shellfish consumption	78 (80%)	3 (18.0)	19.1	4.4-94.3
Travel	25 (26%)	2 (12%)	2.6	0.5-17.7
Household of day-care child	12 (12%)	3 (18%)	0.66	0.1-3.3
Intravenous drug use	1 (1%)	0 (0%)	-	-
Well-water drinking	3 (3%)	1 (6%)	0.51	0.0-13.58

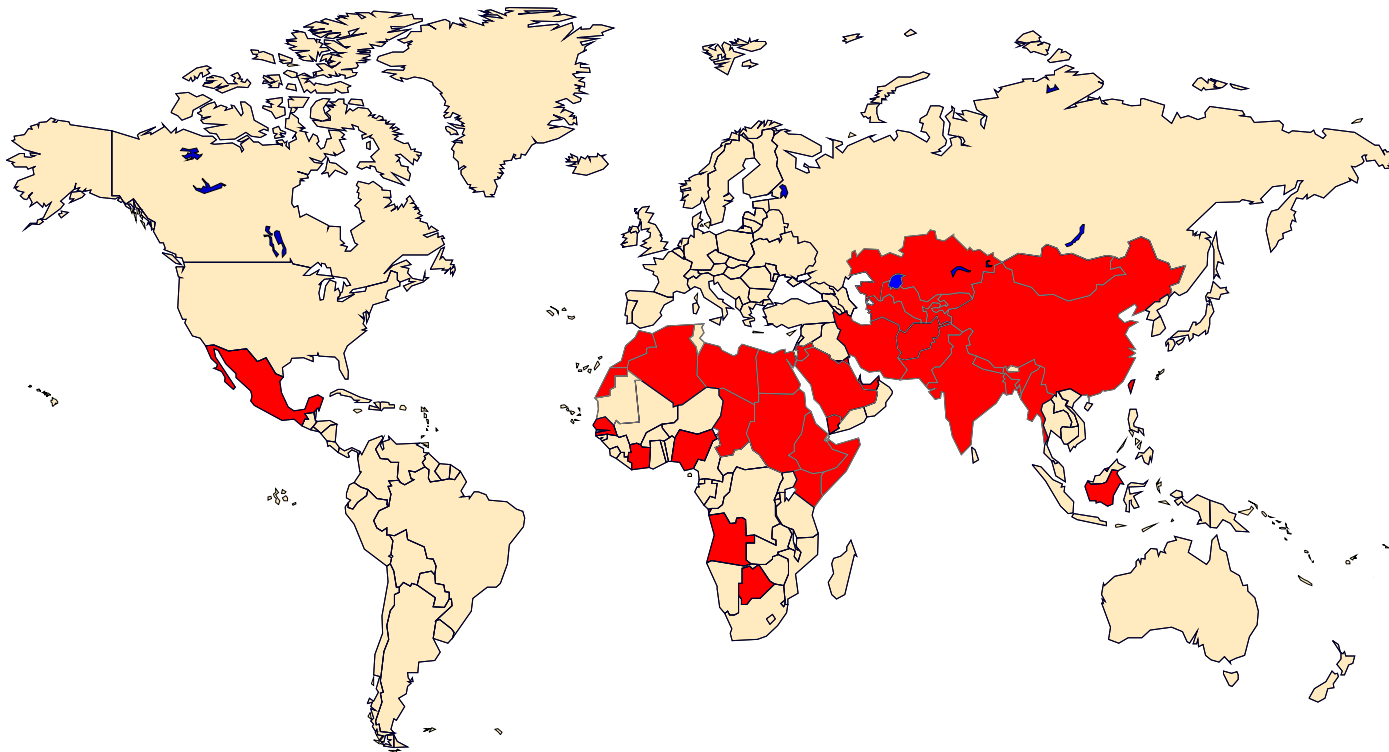


Virus dell'Epatite E (HEV)



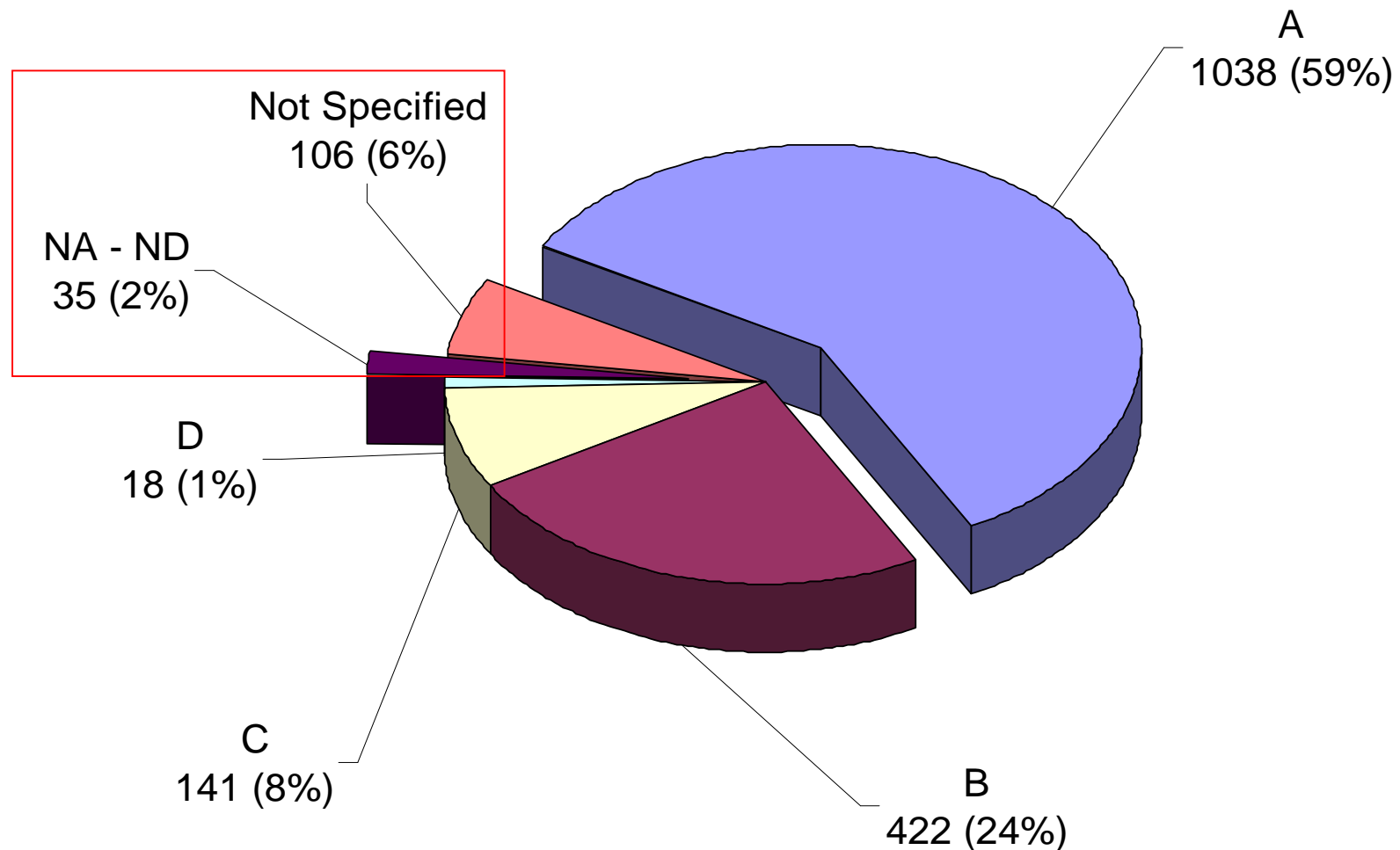
- Unenveloped, ssRNA virus, small (27-34 nm)
- Formerly associated with *Caliciviridae*, recently assigned to the new genus *Hepevirus*

Distribuzione dell'Epatite E nel mondo



- The largest outbreak was reported in northeast China, with 100,000 people affected between 1986 and 1988
- The overall case fatality rate is 4% (much higher in pregnancy)

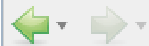
Where HEV cases may possibly be (SEIEVA 1997-2004)



Estimated HEV Incidence 0.4 – 0.8 cases/100.000

Dipartimento di Sanità pubblica veterinaria e sicurezza alimentare





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Page last updated at 13:00 GMT, Wednesday, 30 April 2008 14:00 UK

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Hepatitis E outbreak on P&O liner

Hundreds of holidaymakers are being tested for Hepatitis E after an outbreak onboard P&O liner Aurora.

Seven passengers contracted the virus during an 11-week world cruise which ended in Southampton on 28 March.

All the passengers onboard were sent a letter from the Health Protection Agency requesting a blood sample.

The HPA advises that the virus, which affects the liver, can be fatal but only in rare cases. P&O said it was cooperating fully with the inquiry.

It is thought the passengers caught the virus through eating or drinking contaminated food.

The HPA said about 1,100 passengers volunteered to be screened but only a sample of 600 - who provided blood samples in the time frame - will be sent a questionnaire asking them what they ate and drank on board and ashore.



The Aurora was at the centre of an outbreak of the Norovirus in 2003

“The ship has rigorous public health procedures and underwent a formal public health inspection recently in which it scored very highly”

The Health Protection Agency



BBC Hampshire

Information and features on the BBC Hampshire website

SEE ALSO

- ▶ **Aurora cruise fiasco to cost £26m**
15 Feb 05 | Hampshire
- ▶ **Passengers leave troubled liner**
21 Jan 05 | Hampshire
- ▶ **'Bug ship' arrives home**
06 Nov 03 | Europe
- ▶ **'Worst over' on virus cruise ship**
01 Nov 03 | UK

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- ▶ **Health and Protection Agency**

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- ▶ **Bikers protest over fuel prices**

Luxury Liner Aurora Returns To Southampton

Passengers are pictured after leaving the luxury liner Aurora on its return back to Southampton docks after P&O cancelled the world cruise ship's journey due to engineering problems, January 21, 2005 in Southampton, England. The Aurora has been hampered with problems since its launch day, firstly the champagne bottle didn't smash (considered bad luck) It also broke down on its maiden voyage, and in 2003 was marred by an outbreak of contagious sickness. (Photo by Graeme Robertson/Getty Images)



BBC NEWS

Was Aurora doomed from the start?

A brief history of a ship which was hit by bad luck from the very start.

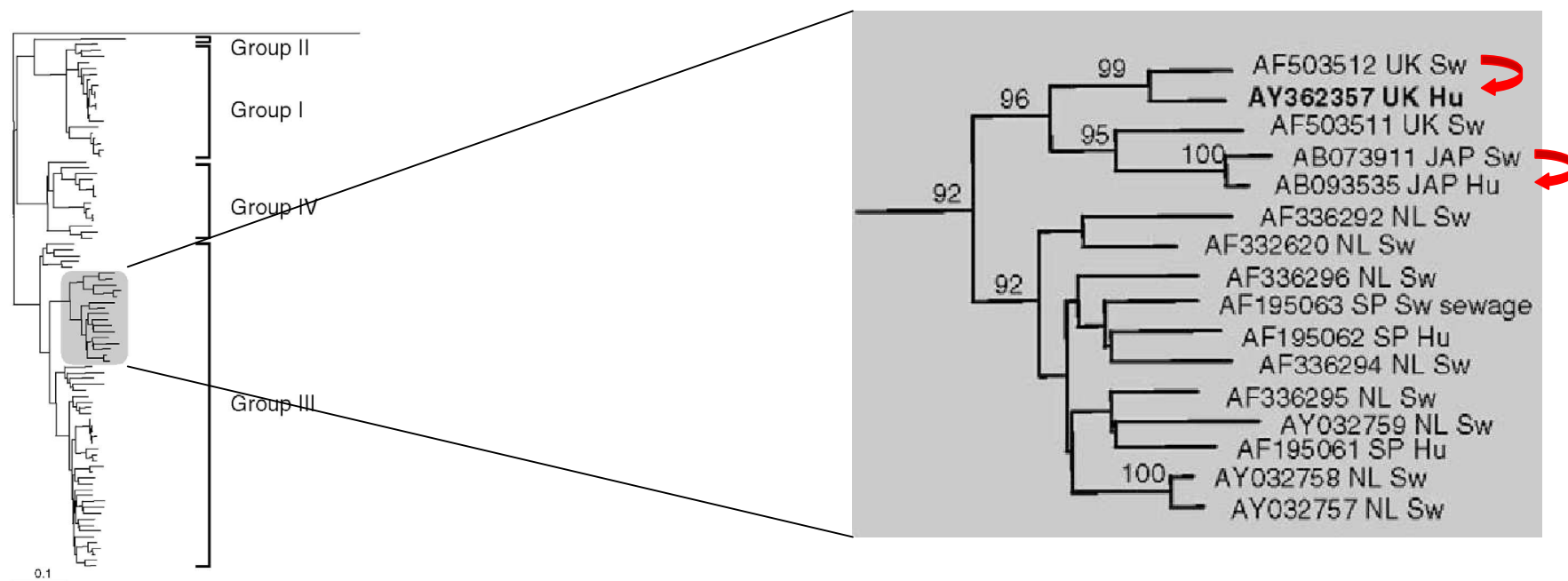
27 April 2000

In an elaborate opening ceremony, the Princess Royal christens the new £200m superliner Aurora at its home port of Southampton.

But the champagne bottle fails to smash - something sailors consider a bad omen.



Ceppi zoonotici di HEV dal suino?



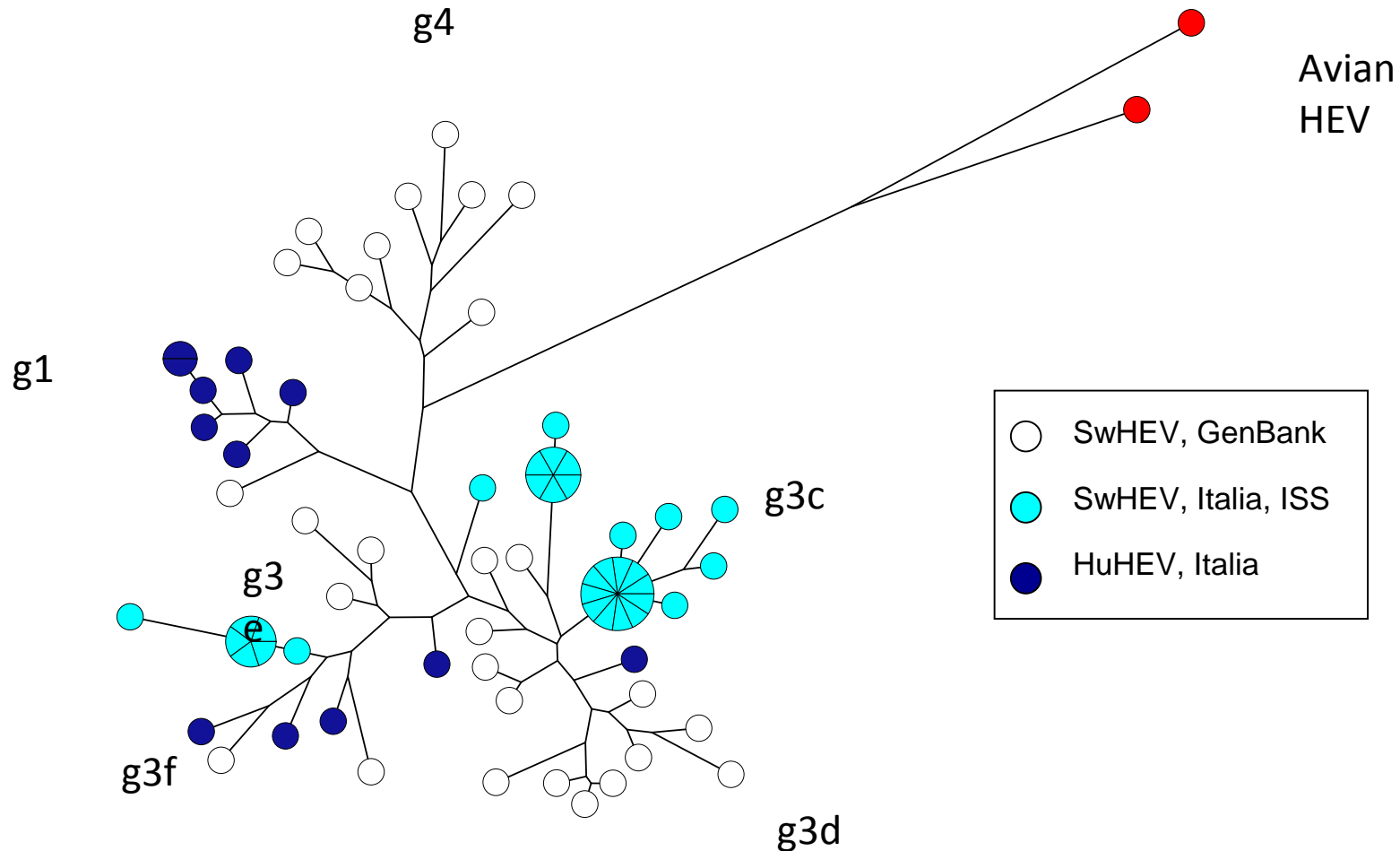
... a case of acquired infection of a strain of hepatitis E virus (HEV) with a 100% amino acid identity to the analogous region in strains of HEV circulating in a United Kingdom pig herd. This case further supports the theory that autochthonous HEV infection in industrialized countries is zoonotic...



Banks et al. Emerging Infect Dis 10, 2004

Dipartimento di Sanità pubblica veterinaria e sicurezza alimentare

Filogenesi di HEV suino in Italia



Basic maximum parsimony tree

GT-3 HEV IN FARMED PIGS, NORTHERN ITALY, 2006

Detection of swine HEV RNA in stools, by type of herd and production stage

Pigs positive/tested by production stage (%)

Type of farm ^a	Farm no.	Gilts (0 parities ^b)		Young sows (1–2 parities ^c)		Old sows (>2 parities ^d)		Weaners (<120 days old)		Fatteners (>120 days old)		Total	
F-W	2	7/10	(70.0)	7/10	(70.0)	7/10	(70.0)	8/10	(80.0)	–	–	29/40	(72.5)
F-W	6	4/9	(44.4)	4/10	(40.0)	8/10	(80.0)	7/9	(77.8)	–	–	23/38	(60.5)
Total F-W		11/19	(57.9)	11/20	(55.0)	15/20	(75.0)	15/19	(78.9)	–	–	52/78	(66.7)
F-F	1	3/10	(30.0)	5/10	(50.0)	9/10	(90.0)	1/10	(10.0)	6/10	(60.0)	24/50	(48.0)
F-F	3	4/9	(44.4)	2/10	(20.0)	2/9	(22.2)	2/10	(20.0)	2/10	(20.0)	12/48	(25.0)
F-F	4	2/10	(20.0)	2/10	(20.0)	1/10	(10.0)	1/7	(14.3)	0/10	(0.0)	6/47	(12.8)
F-F	5	5/10	(50.0)	2/7	(28.6)	4/9	(44.4)	8/18	(44.4)	2/7	(28.6)	21/51	(41.2)
Total F-F		14/39	(35.9)	11/37	(29.7)	16/38	(42.1)	12/45	(26.7)	10/37	(27.0)	63/196	(32.1)
All farms		25/58	(43.1)	22/57	(38.6)	31/58	(53.4)	27/64	(42.2)	10/37	(27.0)	115/274	(42.0)

^a F-W: farrow-to-weaning; F-F: farrow-to-finish.

^b Age range: 7–10 months.

^c Age range: 11–15 months.

^d Age range: 1–5 years.



IMPORTED AND AUTOCHTHONOUS HEPATITIS E, ITALY, 2007-10

Patient	Age	Gender	Year of	Patient's	Possible Risk	PCR Results:			Genotype
ID			Isolation	Country of	factors	Assay (PCRs)			
				Origin		MTase	RdRp	Capsid	
						(666/667)	(653/654)	(711/712)	
E704	26	M	2007	Italy	Eating raw seafood	+	-	-	G3
E804	30	M	2008	Bangladesh	Travel to Bangladesh	+	+	-	G1
E805	24	M	2008	Italy	Travel to India	+	+	-	G1
E806	40	M	2008	Bangladesh	Travel to Bangladesh	-	+	-	G1
E807	46	M	2008	Italy	Unknown	-	-	+	G3
809	34	M	2008	Bangladesh	Travel to Bangladesh	-	+	++	G1
E-101	33	M	2009	Bangladesh	Travel to Bangladesh	+	+	+	G1
E-107	21	M	2009	Bangladesh	Travel to Bangladesh	-	+	-	G1
E-108	42	F	2009	Bangladesh	Travel to Bangladesh	-	+	-	G1
E-109	38	M	2009	Bangladesh	Travel to Bangladesh	+	+	-	G1
1001	24	M	2010	Pakistan	Travel to Pakistan	+	+	-	G1
1002	66	M	2010	Italy	Eating pork liver sausages	+	-	-	G3
1004	37	M	2010	Italy	Eating/dissecting a wild boar	+	-	-	G3
1006	29	M	2010	Bangladesh	Travel to Bangladesh	+	+	++	G1
1007	50	M	2010	Italy	Eating raw seafood	+	-	-	G3
1009	30	M	2010	Bangladesh	Travel to Bangladesh	++	++	+	G1
1016	26	M	2010	Bangladesh	Travel to Bangladesh	-	+	+	G1



Table 8. Frequency (%) per age groups of not mutually exclusive risk factors reported by non-A,non-Delta hepatitis cases, in Italy. SEIEVA 1997-2004

Risk factors	0-14 (n. 35)	15-24 (n. 81)	25-39 (n. 208)	≥ 40 (n. 123)	Total (n. 447)
Shellfish consumption	19.4	38.0	36.5	33.9	34.7
Travel to high-medium endemic area	10.0	11.4	12.2	5.9	10.2
Household of day care child	25.9	7.4	8.8	3.2	8.4
Blood transfusion	0.0	0.0	0.5	3.5	1.2
Surgical intervention	6.2	12.2	11.8	10.3	11.0
Endoscopy	0.0	0.0	2.2	5.6	2.6
Hemodialysis	0.0	0.0	0.0	1.7	0.5
Hospitalization	16.7	13.7	17.1	20.0	17.3
Beauty treatment*	0.0	26.7	21.9	19.7	20.5
Dental therapy	6.4	28.0	27.2	26.1	25.5
Drug consumption	36.0	22.9	32.1	52.9	36.7
Intravenous drug use	0.0	7.9	7.3	0.0	4.9
Household of IV drug users	0.0	4.2	3.3	0.9	2.5
≥2 sexual partners (last year)	0.0	16.9	24.3	14.6	18.3
Household of HBsAg+ carrier	3.7	6.4	12.5	5.0	8.5
Household of anti-HCV+ subject	3.7	5.1	1.4	2.0	2.4

* Piercing, tattooing, attendance to manicurist/chiroprapist, barber shop shaving





REVIEW ARTICLE

Virus hazards from food, water and other contaminated environments

David Rodríguez-Lázaro¹, Nigel Cook², Franco M. Ruggeri³, Jane Sellwood⁴, Abid Nasser⁵, Maria Sao Jose Nascimento^{5,6}, Martin D'Agostino², Ricardo Santos⁷, Juan Carlos Saiz⁸, Artur Rzeżutka⁹, Albert Bosch¹⁰, Rosina Gironés¹⁰, Annalaura Carducci¹¹, Michelle Muscillo², Katarina Kovač¹, Marta Diez-Valcarce¹, Apostolos Vantarakis¹², Carl-Henrik von Bonsdorff¹³, Ana Maria de Roda Husman¹⁴, Marta Hernández¹ & Wim H. M. van der Poel^{15,16}

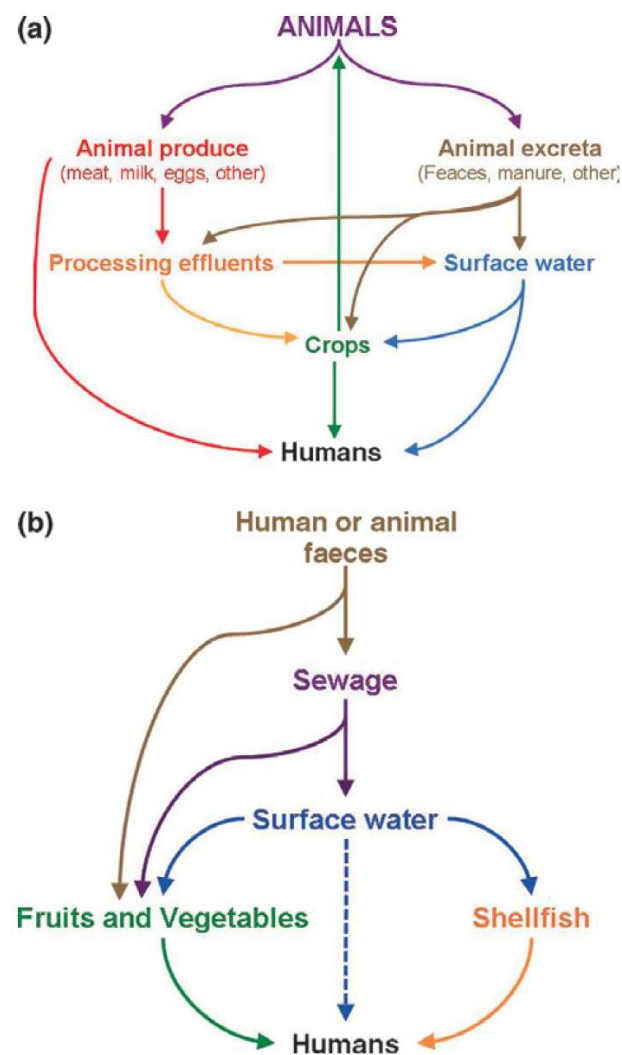


Fig. 1. Contamination routes for environmental virus hazards (a) of animal origin and (b) in foods. (a) Contamination routes of



Aichi Virus, Norovirus, Astrovirus, Enterovirus, and Rotavirus Involved in Clinical Cases from a French Oyster-Related Gastroenteritis Outbreak[▽]

Françoise S. Le Guyader,^{1*} Jean-Claude Le Saux,¹ Katia Ambert-Balay,² Joanna Krol,¹ Ophelie Serais,³
Sylvain Parnaudeau,¹ Hélène Giraudon,² Gilles Delmas,⁴ Monique Pommepuy,¹
Pierre Pothier,² and Robert L. Atmar⁵

Following a flooding event close to a shellfish production lagoon, 205 cases of gastroenteritis were linked to oyster consumption. Twelve stool samples from different individuals were collected. Analysis showed that eight samples were positive for multiple enteric viruses, and one stool sample had seven different enteric viruses. Analysis of shellfish implicated in the outbreak allowed detection of the same diversity of enteric viruses, with some viral genomic sequences being identical to those obtained from stool sample analysis. Shellfish were contaminated by as many as five different enteric viruses. For the first time in Europe, Aichi virus was identified in oyster samples. Shellfish samples collected over 3 weeks following the outbreak showed a progressive decline in the level of virus contamination as measured by the virus diversity detected and by quantitative reverse transcription-PCR.



J Appl Microbiol. 2010 Sep;109(3):1093-104. doi: 10.1111/j.1365-2672.2010.04772.x.

Detection and molecular characterization of enteric viruses in environmental samples in Monastir, Tunisia between January 2003 and April 2007.

Sdiri-Loulizi K, Hassine M, Aouni Z, Gharbi-Khelifi H, Chouchane S, Sakly N, Neji-Guédiche M, Pothier P, Aouni M, Ambert-Balay K.

METHODS AND RESULTS: A total of 250 sewage (raw and treated) and 60 **shellfish** samples were collected between January 2003 and April 2007 in Monastir region, Tunisia. Group A **rotavirus** (RVA) was detected in 80 (32%) sewage samples, norovirus (NoV) in 11 (4.4%) and enteric adenovirus (AdV) in 1 (0.4%). Among 60 **shellfish** samples collected near sewage effluents, one was contaminated by NoV (1.6%).

J Appl Microbiol. 2010 Dec;109(6):1979-87. doi: 10.1111/j.1365-2672.2010.04827.x.

Assessment of adenovirus, hepatitis A virus and rotavirus presence in environmental samples in Florianopolis, South Brazil.

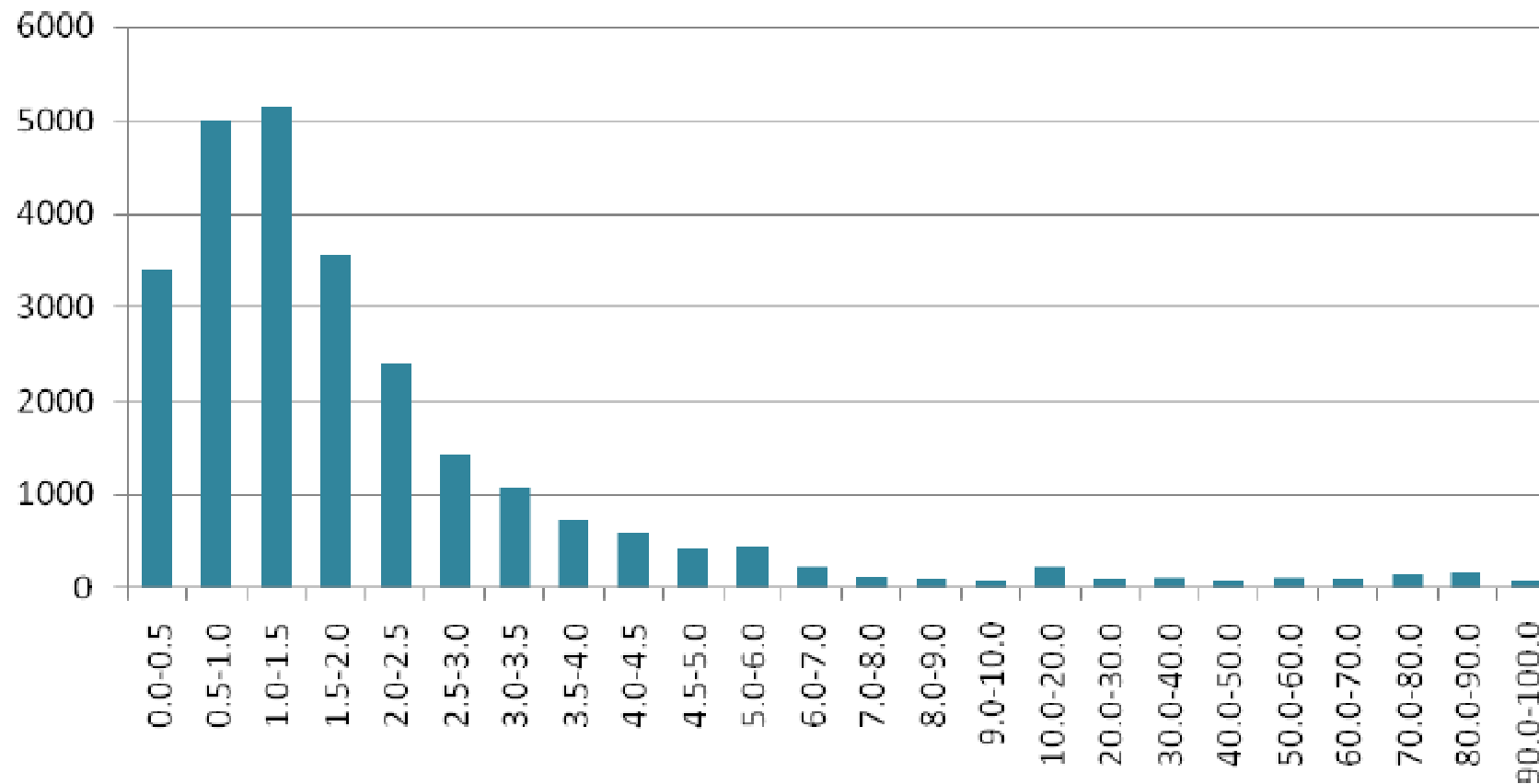
Rigotto C, Victoria M, Moresco V, Kolesnikovas CK, Corrêa AA, Souza DS, Miagostovich MP, Simões CM, Barardi CR.

METHODS AND RESULTS: Water samples from various sources (seawater, lagoon brackish water, urban wastewater, drinking water sources-with and without chlorination and water derived from a polluted creek) and oysters of two growing areas were analysed by enzymatic

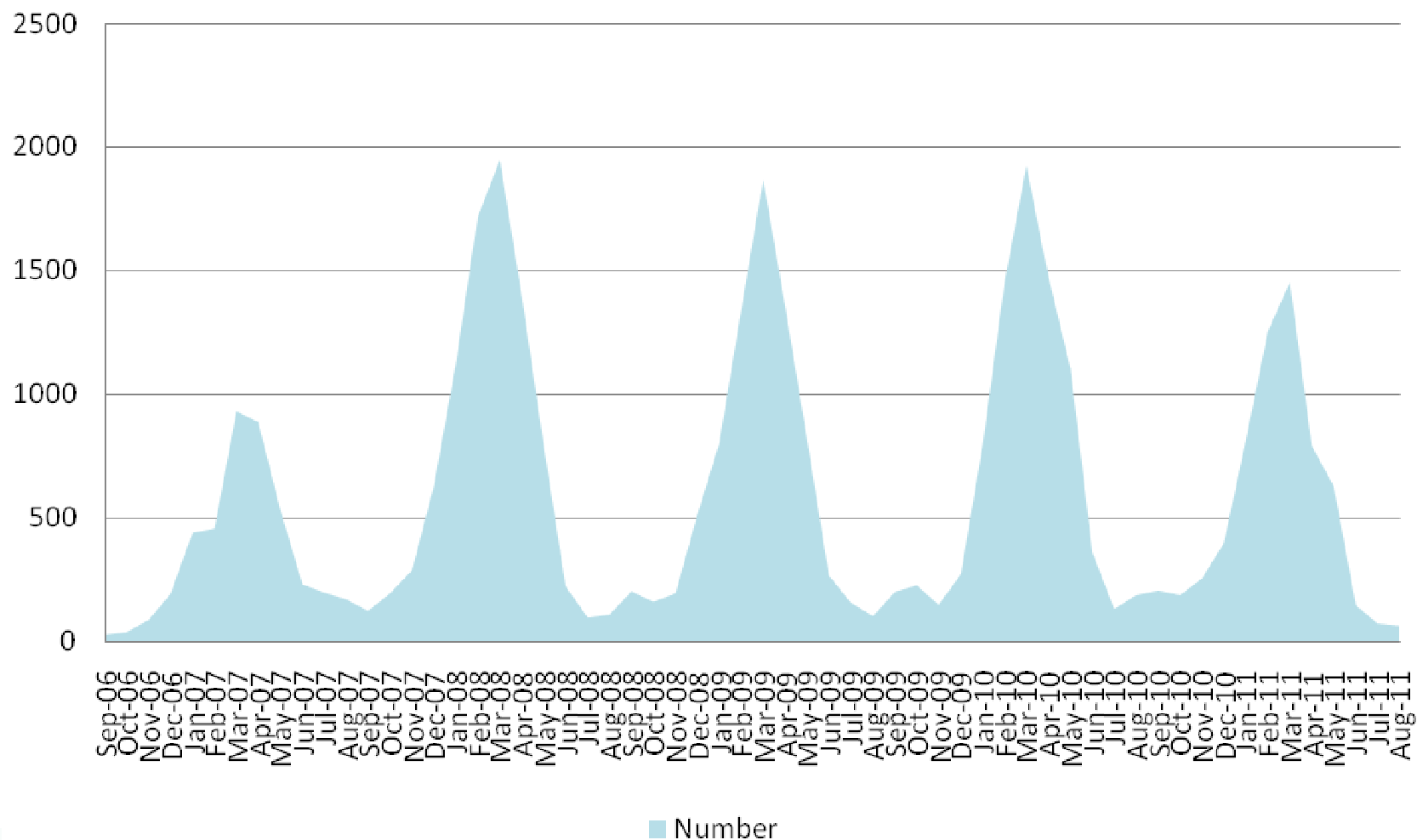
viability assay by integrated cell culture-PCR (ICC-PCR). From June 2007 to May 2008 in a total of 84 water samples, 54 (64.2%) were positive for HAdV, 16 (19%) for RV-A and 7 (8.3%) for HAV. Viability assays showed nonpositive samples for HAV; though, infectious viruses were confirmed for RV-A (12.5%) and HAdV (88.8%). Oyster samples by PCR were



Figure 6: Rotavirus infections by age group in all countries between September 2006 and October 2011 (n=25,800)



Temporal distribution of rotavirus infections in the EuroRotaNet database in four consecutive seasons, 2006/07 - 2010/11





001011

Ministero della Salute

Direzione Generale per la sicurezza degli alimenti e della nutrizione
UFFICIO VIII-Ex VI

Prot. DGSAH/VIII (ExVI) 3734

Roma, 20.4.2007

Agli Assessorati alla
Sanità delle Regioni e

OGGETTO: RACCOMANDAZIONE RELATIVA ALLA RICERCA DEL
NOROVIRUS NEGLI ALIMENTI.

6. Controllo delle epidemie

Si ritiene che circa nel 10-20% dei casi, la causa scatenante delle epidemie sia rappresentata dal consumo di alimenti contaminati da *Norovirus*.

Le epidemie di *Norovirus* si manifestano con un decorso molto rapido, che si sviluppa generalmente nello spazio di qualche giorno fino a una settimana, anche se possono durare molto più a lungo, sino alla rimozione o sanitizzazione della sorgente di infezione. Questo si spiega con l'alto rischio di contagio del virus e con la sua capacità di resistere relativamente bene a condizioni ambientali sfavorevoli.

La messa in atto di misure immediate è essenziale per controllare la propagazione di un'epidemia di *Norovirus*. A questo riguardo giocano un ruolo centrale le misure attuate in caso di sospetto: l'apparizione improvvisa di casi di diarrea e di vomito, in più del 50% dei casi, deve immediatamente far sospettare un'epidemia di *Norovirus*.

Il Direttore Generale

(Dott. Silvio Borrelli)

9. Invio dei campioni

I Laboratori di riferimento a cui inviare i campioni per la ricerca di *Norovirus* e virus enterici in caso di allerta sono:

Istituto Superiore di Sanità
viale Regina Elena 299, 00161 Roma

- Centro per la qualità degli Alimenti e i Rischi Alimentari

Molluschi e prodotti della pesca

Dott.ssa Luciana Croci

Tel 0649902477

Fax 0649902045

e-mail: luciana.croci@iss.it

Alimenti vegetali ed altri alimenti

Dott.ssa Laura Toti, dott. Dario De Medici

Tel 0649902779 - 0649902477

Fax 0649902045

e-mail toti@iss.it ; dario.demedici@iss.it

- Dipartimento di Sanità Alimentare ed Animale

Campioni di feci e altro materiale biologico

Dott. Franco Ruggeri

Tel 0649902980

e-mail franco.ruggeri@iss.it

Istituto Zooprofilattico sperimentale della Lombardia e dell'Emilia Romagna - sez Brescia

Via Bianchi 9, 25124 Brescia

- Dipartimento Alimenti e Sicurezza Alimentare
gli alimenti e campioni biologici

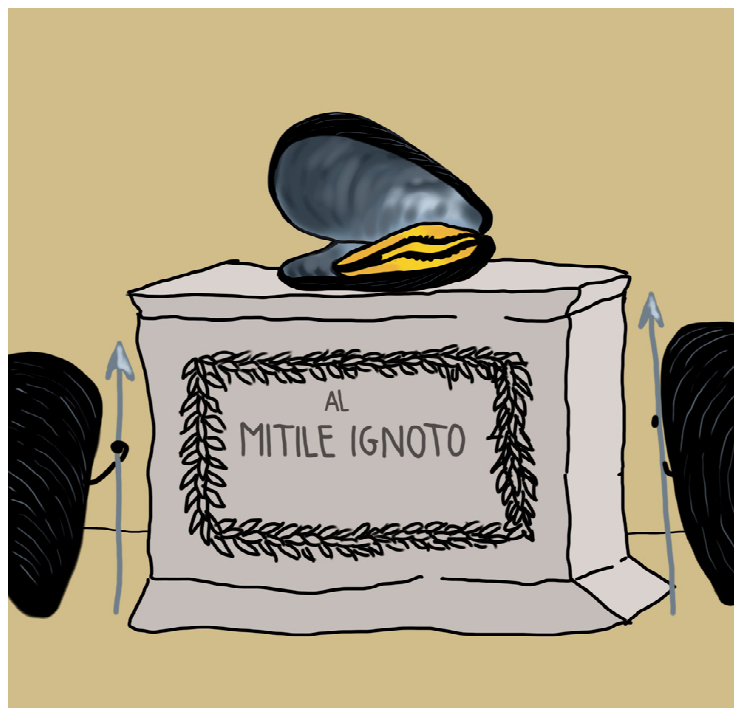
Dott. Paolo Boni, dott.ssa Nadia Losio

Tel 030 2290543 - 0302290544

Fax 0302290556

e-mail pboni@bs.izs.it, nlosio@ibs.izs.it





Grazie dell'attenzione