

ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD
FOODBORNE VIRAL INFECTIONS

Issue

1. In 1998 the ACMSF published its report on foodborne viral infections which assessed the significance of viruses as agents of foodborne infection in humans. The FSA wishes to seek the Committee's advice on whether it is timely to review this report in light of key developments in this area since its publication.

Background

2. The major cause of outbreaks of viral gastroenteritis is the small round structured viruses (SRSVs) identified by electron microscopy on the basis of their morphology. These viruses are spread by the faecal/oral route, by hand to mouth transfer of infected vomit from the contaminated environment and possibly by ingestion of aerosolised vomit. Foodborne viral disease occurs when food is inadvertently contaminated by material from an infected human source (ACMSF 1998).
3. Historical evidence from outbreak investigations indicated that the infectious dose of viral disease is low and illness may occur after ingestion of 10-100 virus particles. The most common cause of foodborne viral hepatitis is hepatitis A although foodborne incidents in the UK due to hepatitis A are rare (ACMSF, 1998). More recently ACMSF also considered Hepatitis E and concluded that, based on the limited information available the risk of acquiring these viruses through the food chain was low (ACMSF 2005; ACMSF 2006).
4. In 1994 the ACMSF set up a Working Group on Foodborne Viral Infections to examine the adequacy of epidemiological investigations of foodborne disease and to consider the need for research into extraction, detection, identification and isolation techniques for foodborne viruses. The Group focussed on the noroviruses (i.e. small round structured viruses) and hepatitis A viruses which could be spread by the faecal/oral route via food or water and person to person contact.
5. The report considered foodborne illness, sources and routes of transmission, and prevention and control measures for foodborne viruses which present in man as gastroenteritis or viral hepatitis. The report concluded that foodborne viral hepatitis was rare, although there was a risk, both from food handlers infected with hepatitis A virus contaminating ready to eat food, and from lightly cooked bivalve molluscan shellfish (ACMSF, 1998).

6. Recommendations arising out of the report covered a range of issues including:
 - improved surveillance, detection, reporting and control of foodborne viral infection;
 - effective enforcement of Food Hygiene regulations;
 - development of more Industry Guides to Good Hygiene Practice;
 - reduction of pollution-related illness associated with shellfish consumption;
 - control of sewage sludge and implications for growing crops of contamination with human waste material;
 - research into effective measures of food sanitisation especially fruit and vegetables;
 - shellfish-related research on methods of isolating and detecting viruses, alternative viral indicators and behaviour of viruses during depuration;
 - research on the behaviour of viruses during sewage treatment processes (ACMSF 1998; MAFF/DH 1998)
7. Since the publication of the Committee report in 1998 further insight into the epidemiology of enteric viral infections has been provided by the findings of the Infectious Intestinal Disease Study in England. The study emphasised the importance of noroviruses and rotavirus infections in particular. Further work on a nucleic acid archive derived from faecal samples in the study has enhanced the detection rate for viruses and other organisms in the study and highlighted the importance of asymptomatic carriage and mixed infections (Amar *et al.* 2007). Understanding the aetiology of these infections will be important in assessing the contribution of viruses to infectious intestinal disease in the UK.
8. There have been several interesting developments in terms of outbreaks of foodborne viral infections since publication of the Committee's report. Outbreaks including shellfish continue to be seen with molecular epidemiology helping to pinpoint international outbreaks (Le Guyader *et al.* 2006). Oysters continue to pose a potential risk of viral infection with outbreaks linked to the consumption of shellfish reported since 1998 including a well documented report linked to norovirus in 2004 of fifteen people becoming ill after consuming oysters sourced from Northern Ireland (Lamden *et al.* 2004).
9. Several important outbreaks have been seen involving fresh produce notably Hepatitis A and green onions in the USA (Wheeler *et al.* 2005), and norovirus (Chancellor *et al.* 2006), and soft fruits in Europe (Fell *et al.* 2007; Le Guyader *et al.* 2004).
10. Since 1998, significant effort has been devoted to the development of methods for the detection and quantification of viruses in shellfish, including alternative viral indicators. Of the methods currently available, the PCR based assays seem to offer the best prospects for detecting low numbers of copies of the viral genome. Consequently, a real-time reverse

transcribed quantitative PCR (RT-PCR) method is currently being addressed by the European Committee on Normalization (CEN), with the publication of a validated standard method expected by 2012.

11. Work on bacteriophage in shellfish has shown that in some circumstances this may be a better indicator of the presence of viruses than relying on levels of *E. coli*, as is the current practice (Dore *et al.* 2000).
12. Research is also continuing on the behaviour of viruses during depuration and sewage treatment. In a key development for this field of study, researchers in the US have reported the first *in vitro* cell culture of norovirus. This research will allow further studies on the effectiveness of specific measures aimed at reducing Norovirus load in shellfish.
13. New work on viruses in food is proposed for the Codex Committee on Food Hygiene, which includes bivalve molluscan shellfish. This is supported by preliminary work by FAO/WHO which is currently working on an expert consultation on foodborne viruses more generally.
14. In 1995, the Department of Health published guidance for businesses, enforcement officers and health professionals on the fitness to work of food handlers, which included advice on the transmission of viruses from food handlers to the public through food. This is now owned by the Food Standards Agency and will be updated in the near future taking into account an evidence based review of the published literature on the occupational management of infected food handlers, which has been taken forward by NHS Plus (DH, 1995).
15. A total of five Industry Guides were published by the end of 1998 and a further seven have been published since. The FSA expects that another 10 or more will be developed over the next few years and that most of the existing Guides will be updated and re-published.

Members are invited to:

- Provide their views on the foodborne risk to human health linked to foodborne viral infections
- Consider whether it is timely to carry out a review of foodborne viral infections in light of the developments outlined in paragraphs 7-15.

To enable a full discussion of the issues, the Committee may wish to convene a Working Group to consider this issue further.

**Secretariat
June 2007**

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