ACM/635

DISCUSSION PAPER

ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD (ACMSF)

SEVERE ACUTE RESPIRATORY SYNDROME : ADVICE ON THE RISK TO HUMAN HEALTH

Introduction

1. Severe acute respiratory syndrome (SARS) was first described in early March. To date (18 June), over 8,000 cases have been reported with around 800 deaths. Although the majority of cases are in the Far East, and particularly in mainland China, cases have been reported worldwide from 29 countries, including 243 cases in Canada, 72 in the USA and 4 in the UK. The rate at which new cases are being reported has decreased sharply in recent weeks. Current estimates suggest that around 15% of cases are fatal and that mortality is even higher (45%) in the over 65s.

2. Intense efforts to identify the cause of the syndrome resulted in the identification of a novel coronavirus which is generally accepted as being the causative agent of SARS. The SARS coronavirus gene sequence is only distantly related to any other previously-described coronavirus.

Coronaviruses : zoonotic potential

3. Coronaviruses are single-stranded RNA viruses that infect a wide range of mammalian and avian species. They are an important cause of a number of respiratory and gastro-intestinal diseases in animals but can also affect the central nervous system, the liver, the joints and vascular systems. The following are some animal diseases caused by coronaviruses:

Animal	Virus	Disease
Cat	Feline infectious peritonitis virus	Peritonitis, pneumonia, meningoencephalitis, wasting
Dog	Canine coronavirus	Enteritis
Cattle	Bovine coronavirus	Viral diarrhoea of the young calf, winter dysentery of the adult cow

Pig	Transmissible gastroenteritis virus	Explosive outbreaks of diarrhoea in young pigs causing significant mortality
Pig	Porcine epidemic diarrhoea virus	Diarrhoea in young pigs
Chicken	Infectious bronchitis virus	Respiratory disease of chickens

4. Coronaviruses tend to be species specific. However, canine coronavirus is closely related to transmissible gastroenteritis virus of pigs and, although canine coronavirus does not infect pigs, transmissible gastroenteritis virus produces a sub-clinical infection in dogs. In humans, infection with two distinct coronaviruses causes cold symptoms. Animal coronaviruses have not been shown to be transmissible to humans, although bovine coronaviruses are capable of infecting some human cell lines in the laboratory.

5. Recent investigations have identified a closely related (but not identical) virus in 6/6 masked palm civet cats, a badger and a racoon dog from a live animal market in South China. The animal isolates all have an identical 29 nucleotide sequence not found in human isolates suggesting that they did not acquire the infection from humans. However, 8 civet cats from other markets and the wild have been negative, so it is possible that the animals at the first market were infected from an unknown animal or human source. Support for an animal reservoir may be derived from the fact that 66/508 animal handlers tested at markets in Guangdong were shown to have antibodies to the SARS virus. However, the background level of seropositivity in non-animal handlers from the same region has not been ascertained.

6. The current consensus appears to be that, whilst the virus is likely to have had an animal source, there is no evidence to suggest frequent zoonotic transfer. Limited circulation in humans or a recent change from an asymptomatic infection in humans are possible alternative explanations for the recent emergence of this infection.

Epidemiology and routes of transmission

7. Unless there are a large number of cases of sub-clinical or asymptomatic infection, the epidemiology suggests that, in most cases, the virus is not one that transmits very easily. Were this a new strain of influenza, for example, many hundreds of thousands or millions of cases would be expected to have occurred. However, there have been some cases with a very high rate of secondary transmission.

8. Person to person spread by inhalation of airborne droplets from the respiratory tract is the main mechanism of transmission. However, diarrhoea has been a feature of some cases, with prolonged faecal shedding of the virus. In at least one outbreak, contaminated sewage with subsequent aerosolisation of the virus was the putative route. There is no direct evidence of transmission by the faecal-oral route but, in view of the fact that some of the animal coronaviruses cause gastrointestinal disease, the current state of knowledge does not permit the possibility of a gastrointestinal portal of entry to be dismissed

Potential for foodborne transmission

9. For foodborne transmission to occur, the virus would have to be present in food and would have to be able to give rise to infection by the oral route.

10. Whilst the virus may have an animal reservoir, the evidence does not suggest that such a reservoir is playing a part in perpetuating the epidemic. It is unable to infect either pigs or poultry and appears to be very different from the coronaviruses found in other food animals. It is therefore extremely unlikely that the virus will be present in meat for human consumption.

11. Virus is found in stool samples from patients and is stable at room temperature for 1-2 days in faeces and urine. It is also stable for up to 4 days in lower acidity diarrhoeal stools. Hence there is a possibility for contamination of food by infected food handlers if basic food hygiene practices are not followed. However, current evidence suggests that asymptomatic carriers of the virus do not transmit infection to others or, if they do, it is a rare event. If this is true of direct person to person transmission, it is all the more unlikely that infection would be transmitted from a healthy food handler via contaminated food.

12. It is therefore highly unlikely that virus will be present in any food, all the more so in countries with no human cases. Although the possibility of a gastrointestinal portal of entry cannot be entirely excluded at this stage, current evidence suggests that, if this exists at all, it would be an unusual mode of transmission.

13. The SARS virus is rapidly killed by heat at 56^{o}C. Therefore, normal cooking would be expected to destroy the virus.

14. For all these reasons, the risk of SARS transmission through the food chain appears to be remote.

Action

15. Members are invited to note and comment on the information provided in this paper and to advise whether they consider any further action is required.

Secretariat

18 June 2003