Scientific Report of the Scientific Panel on Biological Hazards on "Food as a possible source of infection with highly pathogenic avian influenza viruses for humans and other mammals"[1]

SUMMARY

In view of the presence of H5N1 avian influenza in the EU and the heightened concern of the general public with respect to the safety of poultry products and eggs for human consumption, the European Food Safety Authority requested the preparation of a comprehensive background document on the state-of-science of the fate of highly pathogenic avian influenza (AI) viruses (mainly H5N1) in avian species and the possible transfer of the virus to other species including humans via the food chain.

Highly pathogenic H5N1 virus causes a generalised infection in several avian species with virus dissemination to all organs and virus presence in all secretions and excretions. Edible tissues from infected animals, if collected at the height of infection which is 2 to 5 days after contact with virus has taken place, thus may contain high virus quantities.

Direct transfer of H5N1 to humans occurs rarely and particularly after very close contact with infected animals. The exact entry route(s) of the virus in humans is(are) not known but it is generally accepted that respiratory and/or oropharyngeal tissues are the entry sites. However, when one considers the low number of recorded human infections in relation to the high number of people that have been exposed to H5N1 virus infected animals, it is clear that a readily accessible portal of entry does not exist. The possibility of virus entry via the gastrointestinal (GI) tract after ingestion of virus with food has been raised. So far, there is no proof that virus replicates in the human intestine. The presence of diarrhoea in several patients, the detection of viral RNA in the intestines of two patients and the demonstration of infectious virus in rectal swabs of one patient do not allow one to conclude that the GI tract is a portal of entry or a target organ. Foodborne virus might be a source of infection after ingestion but with virus uptake taking place via oropharyngeal tissues, if this site can serve as portal of entry. The existence of an undisclosed virus entry site in the intestinal tract can, however, not be ruled out at this time.

In felines, infection with H5N1 virus can occur naturally after eating infected carcasses from avian species and can be reproduced by oral feeding of infected chicks. However it is not proven that the GI tract is a portal of entry or a target organ in these species.

The pathogenetic basis for the observation that H5N1 virus causes infection in some humans and not in others remains unknown. The role of several viral and host factors

[1] For citation purposes: Scientific report of the Scientific Panel on Biological Hazards on "Food as a possible source of infection with highly pathogenic avian influenza viruses for humans and other mammals", *The EFSA Journal 2006, 74, 1-29*

such as receptors, receptor binding sites, genetic make up of viral strain, virus quantity at exposure, etc. is discussed. Further more research on this aspect is required, as is also the case with regard to the GI tract.

In several mammalian species (including felines, mice and ferrets), H5N1 shows a neurotropic character and this aspect possibly merits more attention in the pathogenesis of human infections.

The route(s) of entry and the cell type(s) that enable the virus to enter, and the mechanism of species barrier crossing, must be studied. Some mammals such as cats, ferrets or pigs may serve as a useful model for human infection. Experimental inoculation studies are needed in which different inoculation routes are used and in which sequential examinations are performed on different tissues for virus replication throughout the course of infection. Only by using this approach, can speculation on the portals of entry and routes of infection be avoided. The results obtained may provide useful information to be applied to humans.

KEYWORDS: Avian influenza, routes of entry