Severity of pneumonia in ferrets due to pandemic H1N1 influenza virus is intermediate between that of seasonal H1N1 and highly pathogenic avian influenza H5N1 virus

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Introduction

The newly emerged influenza A H1N1 virus (new H1N1 virus) is the first pandemic influenza virus of this century. Three influenza pandemics of the previous century caused variable mortality with the development of severe pneumonia. However, the ability of the new H1N1 virus to cause pneumonia is poorly understood.

Aim

To compare the pathology of new H1N1 influenza virus with highly pathogenic avian influenza virus (HPAI) H5N1 and seasonal H1N1 in ferrets.

Results

Our results showed that the new H1N1 virus causes pneumonia in ferrets intermediate in severity between that of seasonal H1N1 virus and HPAI H5N1 virus. The new H1N1 virus replicated well throughout the lower respiratory tract and more extensively than both seasonal H1N1 virus (mainly bronchi) and HPAI H5N1 virus (mainly alveoli).

High loads of new H1N1 virus in lung tissue were associated with diffuse alveolar damage and mortality.

Methods

Three influenza viruses were used: new H1N1 virus (A/NL/802/2009), seasonal H1N1 virus (A/NL/26/2007) and HPAI H5N1 (A/Ind/5/2005).²

• Survival study: groups of 3 (seasonal H1N1) or 6 ferrets, intra-tracheally inoculated with either 10³, 10⁴ or 10⁵ TCID₅₀ virus, euthanized on day 7.

• Pneumonia study: groups of 3 (seasonal H1N1) or 6 ferrets, intra-tracheally inoculated with 10⁶ TCID₅₀ virus, euthanized on day 4.

Both respiratory and extra-respiratory tissues were sampled for virological, pathological and immunohistochemical analyses.

Discussion

Intra-tracheal inoculation of new H1N1 influenza virus causes severe pneumonia in ferrets.

Pneumonia caused by new H1N1 influenza virus is intermediate in severity between that of HPAI H5N1 and seasonal H1N1.

The new H1N1 influenza virus replicates well in epithelial cells in the lower respiratory tract, which is also seen in HPAI H5N1 but not in seasonal H1N1.

Therefore, the new H1N1 virus may be intrinsically more pathogenic for humans than seasonal H1N1 virus.

References