

Influenza virus entry into the CNS via the olfactory nerve

Van Riel, D., Leijten, L., Osterhaus A., and Kuiken, T.

Department of Viroscience, Erasmus MC, Dr. Molewaterplein 50, 3015 GE Rotterdam, The Netherlands

Research question and background

It is known that respiratory viruses, including influenza viruses can enter the central nervous system (CNS), causing CNS disease. Influenza virus infections have been linked to both acute (encephalitis) and chronic CNS disease (Alzheimer's and Parkinson's disease) in humans. The route by which influenza viruses enter the CNS has only been studied to a limited extent. However, studies in ferrets and in a human fatality associated with influenza, show that the olfactory nerve serves as shortcut into the CNS. The olfactory nerve directly connects the nasal cavity—which is the replication site for influenza viruses—with the olfactory bulb, which is part of the CNS. The disease manifestations of influenza virus entry via the olfactory nerve might vary from being asymptomatic to severe encephalitis.

Methods and tissues used

To get more insight into the relative incidence by which influenza viruses enter the CNS via the olfactory nerve we would like to screen all olfactory bulbs from donors who died during the past influenza seasons. Initially we want to isolate RNA from olfactory bulb tissues (either paraffin embedded, or frozen) and identify possible influenza A virus positive cases. From these cases we would like to obtain more CNS tissues, to determine the presence of influenza virus antigen, and the histological lesion. In addition, we want to try and isolate viruses from frozen tissues, to determine the influenza virus subtype and the genetic background of these viruses

Results and conclusion

We have received olfactory bulb tissues from 106 donors. Unfortunately we have not detected influenza virus RNA in any of these tissues. We are currently screening all tissues for other respiratory viruses, such as picornaviruses and paramyxoviruses.