



Subclinical Disease in Monkeys Exposed to H5N1 by Mouth and Stomach

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A new study [published in Nature](#) found that highly pathogenic H5N1 avian influenza virus (HPAI H5N1) administered directly into the mouth and stomach of research monkeys caused self-limiting infection with no recognizable clinical signs of disease. By comparison, other routes of transmission resulted in mild or severe disease.

The findings suggest that drinking raw milk contaminated with H5N1 virus can result in infection but may be less likely to lead to severe illness. Nevertheless, exposure by raw milk – which is a source of several foodborne illnesses – should be avoided to prevent H5N1 infection and potential further spread.

The research team, from NIH's National Institute of Allergy and Infectious Diseases (NIAID), exposed cynomolgus macaques to the same clade 2.3.4.4b HPAI H5N1 virus circulating in U.S. cattle. Transmission routes included via the nose, windpipe (trachea) or directly into the mouth and stomach to mimic infection routes in people.

Animals exposed via the nose and windpipe became infected, developed pneumonia and had varying degrees of disease. Animals infected in a manner that mimicked drinking had a more limited infection with no obvious disease signs. To what extent this work mirrors human infection remains unclear.

The study does suggest that infection through contaminated liquids like raw milk represents a risk for HPAI H5N1 infection of primates. The work cites the “local environment” in the stomach as potentially inactivating the virus and thus, possibly reducing the exposure dose. Scientists at NIAID's Rocky Mountain Laboratories in Hamilton, Montana, led the work.

They exposed six animals each via the nose to mimic an upper-respiratory tract infection; the windpipe to mimic a lower-respiratory tract infection; and in the mouth and stomach to mimic consuming contaminated products. They used a dose of virus close to what has been found in contaminated raw milk. Researchers regularly monitored and examined animals for up to 14 days.

Animals exposed in the mouth and stomach became infected but showed no signs of influenza illness throughout the study. Animals exposed in the nose showed mild respiratory disease, peaking at day 10. Animals exposed in the windpipe showed severe respiratory illness within a week.

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