



## Ontario

### H4N6 influenza virus isolated from pigs in Ontario

Classical H1N1 influenza viruses are the most common influenza A viruses found in swine in Ontario. The H3N2 influenza viruses, similar to currently circulating human strains, have been found in swine in Ontario, but with much lower frequency (1). The H3N2 influenza viruses recovered from swine in Quebec in 1990 have previously been shown to be similar to earlier 1975 human strains, suggesting that pigs act as a reservoir for human influenza virus (2). Newer strains of H3N2 influenza viruses, which are double (human and swine) or triple (human, swine, and avian) reassortments, have emerged in the United States over the last few years (1,3). In addition, H1N2 reassortments of H1N1 and H3N2 viruses have been identified recently in US swine (4).

In the late fall of 1999, the Animal Health Laboratory at the University of Guelph isolated 2 influenza A viruses from a swine herd housed indoors on a farm near a lake in Ontario, on which large numbers of waterfowl congregate each fall. Water used on the farm was sometimes drawn from the lake. This swine herd had experienced clinical respiratory disease in the first week of October, with 5% of 2600 grower/feeder pigs having labored breathing, with coughing and weight loss. Histological examination of the lungs revealed bronchointerstitial pneumonia with necrotizing bronchiolitis and hyperplasia of type II pneumocytes (alveolar cells). *Streptococcus suis*, *Pasteurella multocida*, and *Arcanobacterium pyogenes* were also recovered from the lungs. The outbreak lasted 3 wk, with 12 animals dying during the first 10 d of the outbreak, prior to the initiation of antibiotic therapy.

The viruses, which were recovered from both of 2 lung pools of 2 pigs each by using Madin-Darby canine kidney cells and trypsin, were identified as influenza A by using antigen detection ELISA (DirectigenFlu A; Becton Dickinson, Sparks, Maryland, USA). They hemagglutinated both chicken and guinea pig red blood cells but could not be further typed by using traditional hemagglutination-inhibition (HI) assays and reference antisera to either H1 or H3 viruses. Both were forwarded to the

University of Wisconsin at Madison and the Central Veterinary Laboratory at Weybridge in England, where one (A/Swine/Ontario/01911/99) was typed as H4N6 (5) by using panels of monospecific antisera in HI assays and microneuraminidase-inhibition spot assays. As well, the full-length protein-coding regions of all 8 viral RNA segments of this virus were amplified by reverse transcription-polymerase chain reaction (RT-PCR) and sequenced. Subsequently, the nucleotide sequence of each gene segment was compared with the sequences of reference influenza A viruses available in GenBank. The virus was found to be totally avian and similar to the influenza viruses found to replicate in the epithelial cells of the gastrointestinal tract of ducks. The H4N6 influenza viruses are the most common influenza viruses found in the Canadian wild duck population. **This is the first documentation of the recovery of a wholly avian influenza virus from pigs in North America, and the first isolation of an H4 influenza virus from naturally infected pigs.** This virus was also shown to be of the North American, rather than the Eurasian, lineage of avian influenza viruses. The isolate from the second lung tissue pool was only partially characterized by using RT-PCR to confirm that it was the same overall genotype as A/Swine/Ontario/01911/99.

When herd sera were assessed for the presence of specific antibody, sera from 12 of 12 pigs were negative prior to the outbreak, while sera from 10 of 10 pigs were positive 3 mo following the outbreak, suggesting that this avian virus was transmitted between pigs. Since pigs are susceptible to infection with both avian and mammalian influenza viruses, they serve as intermediate hosts for the adaptation of avian influenza viruses for replication in mammals, and as mixing vessels, where reassortment between avian and human viruses can occur. Hence, the appearance of human, and now avian, influenza viruses in pigs in Ontario is of both veterinary and human public health concern. Vaccines are currently available for swine as an aid in the control of H1N1 and some H3N2 virus strains, but not for H4N6 virus strains. Since these viruses are serologically distinct, vaccine-induced cross-protection between strains is minimal.

Cross-Canada Disease Report provides rapid publication of brief reports of disease trends or new diseases — maximum of 500 words and 2 references. The Report is edited but not refereed.

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Contributions are welcome and may be sent to:

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et peuvent être envoyés à l'adresse suivante :*

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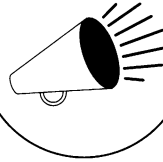
## References

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2. Bikour MH, Frost EH, Deslandes S, Talbot B, Weber JM, Elazhary Y. Recent H3N2 swine influenza virus with haemagglutinin and nucleoprotein genes similar to 1975 human strains. *J Gen Virol* 1995;76:697–703.
3. Zhou NN, Senne DA, Landgraf JS, et al. Genetic reassortment of avian, swine and human influenza A viruses in American pigs. *J Virol* 1999;73:8851–8856.
4. Karasin AI, Anderson GA, Olsen CW. Genetic characterization of an H1N2 influenza virus isolated from a pig in Indiana. *J Clin Microbiol* 2000;38:2453–2456.
5. Karasin AI, Brown IH, Carman S, Olsen CW. Isolation and characterization of H4N6 avian influenza viruses from pigs with pneumonia in Canada. *J Virol* 2000;74:9322–9327.


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## COMING EVENTS



## ÉVÉNEMENTS À VENIR

 **CVMA Conventions/  
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**2001**  
Vancouver, British Columbia  
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Winnipeg, Manitoba  
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### JANUARY/JANVIER 2001

**Faculté de médecine vétérinaire — Technologie et salubrité des viandes : Activités de formation.** Trimestre hiver 2001 à la Faculté de médecine vétérinaire. MMV 6618 : Technologies de transformation des viandes (3 crédits); MMV 6685 : Production animale et santé publique (mise à jour vétérinaire; 4 crédits). Contactez :

D<sup>r</sup> Daniel Perron, Coordonnateur du programme D.É.S.S., Faculté de médecine vétérinaire, Université de Montréal, St-Hyacinthe (Québec).

### Statistical Analysis in Production Medicine — Certificate Series 2000.

Probability, random variables, binomial distributions. Speaker: Dr. Cate Dewey. Contact: SAPM Series, D-205 Veterinary Medical Center, Michigan State University, East Lansing, Michigan 48824 USA.

### American Institute of Ultrasound in Medicine — Obstetrical Ultrasound.

January 12–14, 2001 in Marina del Rey, California, USA. Course director: Lawrence D. Platt, MD. Contact: Professional Development Department, The American Institute of Ultrasound in Medicine, 14750 Sweitzer Lane, Suite 100, Laurel, Maryland 20707-5906 USA; tel.: (301) 498-4100; e-mail: conv\_edu@aium.org.

### American Animal Hospital Association — Distance Learning Programs: Spring Registration.

Distance Education Institute for Veterinary Assistants and Distance Education Veterinary Technology Program. Registration begins November 13, 2000 and ends January 15, 2001. Contact:

Derek Woodbury or Kate Johnson, American Animal Hospital Association, Member Service Center, P.O. Box 150899 Denver, Colorado 80215-0899 USA; tel: (303) 986-2800; fax: (303) 986-1700; Web site: [www.aahanet.org](http://www.aahanet.org).

### Western Canadian Association of Bovine Practitioners — 2001 Annual Conference.

January 18–20, 2001 at the Radisson Airport Hotel in Calgary, Alberta. Contact: Dr. Ray Butler, WCABP Conference Coordinator, 39 Moxon Crescent, Saskatoon, Saskatchewan S7H 3B8, tel. & fax: (306) 651-3383.

### 5th International Sheep Veterinary Congress.

January 21–25, 2001 at the University of Stellenbosch, in Stellenbosch, South Africa. Contact: Ruth Gauche, tel.: + 27 11 792 7501; fax: + 27 11 792 7522; e-mail: [ruthg.reshotline@galileosa.co.za](mailto:ruthg.reshotline@galileosa.co.za).

### Alberta Veterinary Medical Association — Midwinter Conference.

January 24–28, 2001 at the Rimrock Hotel in Banff, Alberta. Contact: AVMA, 750 Weber Centre, 5555 Calgary Trail South, Edmonton, Alberta T6H 5P9, tel.: (780) 489-5007; fax: (780) 484-8311; e-mail: [avma@avma.ab.ca](mailto:avma@avma.ab.ca); Web site: [www.avma.ab.ca](http://www.avma.ab.ca).

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