2013-04-16-026 Avian influenza, human (46): China (H7N9) stealth virus
To: (06) Virology, general; (07) Zoonoses, general; (09) Resistance of microorganisms;
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AVIAN INFLUENZA, HUMAN (46): CHINA (H7N9) STEALTH VIRUS
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A ProMED-mail post <http://www.promedmail.org>
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From: Anne DeGroot <AnnieD@EpiVax.com> [edited]

Scientists at EpiVax performed an extremely rapid bioinformatics analysis on the genome sequences of H7N9 influenza and predict that it will be difficult to make effective vaccines and low cost diagnostics for the newly emerging virus (also called H7N9/A/Shanghai/1/2013), meaning that the new H7N9 may be a "stealth" virus that is able to fly under the immune system's radar. And, they predict, should the H7N9 "stealth virus" adapt itself for human-to-human transmission, it has serious potential for rapid expansion on a global scale.

What makes the new flu invisible to the immune system? The protein that is usually incorporated in vaccines known as HA (hemagglutinin) has fewer immune-stimulating "T cell epitopes" than many previously circulating strains of flu (see image at <http://www.epivax.com/wp-content/uploads/2013/04/H7N9_Immunogenicity_EpiVax_12Apr13_AGM1.jpg>).

The analysis done by the EpiVax team of expert vaccine designers is consistent with reports that previous H7 vaccines also had low immunogenicity. Last season's [2011-2012] H3N2 was also predicted by EpiVax to be low immunogenicity, and epidemiological evidence of outbreaks among H3N2-vaccinated individuals confirms the prediction.
Unless it is engineered for higher immunogenicity, a vaccine against
H7N2 may have similar low efficacy as was seen with H3N2.

Low T cell epitope content generally means that it is harder to make high-affinity antibodies, the type that protect against flu and that are used to make low-cost diagnostic tests like ELISAs. While one rapid test for flu (based on PCR) is available, lacking a low cost rapid test, it could be harder to screen the expanding numbers of individuals that have already been exposed to active H7N9 cases. More than 1000 such cases are being "followed" by Chinese health authorities.

The EpiVax scientists did a similar analysis of pandemic H1N1 in 2009 [1] and correctly predicted that pandemic H1N1 would not cause severe disease in most individuals, a prediction that was subsequently validated in vitro and in vivo by many others. Unfortunately, the immunogenicity news is not so good for H7N9.

Detailed information with references/publications can be found at <http://bit.ly/H7N9EpiVax>.

[1] Previous publication demonstrating cross-conservation between seasonal influenza and H1N1 published during 2009 pandemic: De Groot AS, Ardito M, McClaine EM, Moise L, Martin WD. Vaccine. 2009 Sep 25; 27(42):5740-7. doi: 10.1016/j.vaccine.2009.07.040. Epub 2009 Aug 4. Immunoinformatic comparison of T-cell epitopes contained in novel swine-origin influenza A (H1N1) virus with epitopes in 2008-2009 conventional influenza vaccine.
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[ProMED-mail thanks Professor De Groot for making the EpiVax bioinformatics analysis of the genome sequence available for our readers.

The conclusions of the analysis are in line with previous predictions that the path to development of an effective vaccine may be slow and problematic. Fortunately, hemagglutinin inhibitors are treatment options in the interim. The EpiVax interpretation that the avian H7N9 influenza virus has the properties of a "stealth virus" is novel and in line with current knowledge of the behaviour of the virus. - Mod.CP

A HealthMap/ProMED-mail map can be accessed at:
<http://healthmap.org/r/1zaU>.]

[see also:
Avian influenza, human (45): China: H7N9, update 20130414.1645270 Avian influenza, human (44): China (HE), H7N9 20130413.1643923 Avian influenza, human (43): China, H7N9 update 20130413.1643270 Avian influenza, human (42): China (BJ), H7N9 20130413.1642086 Avian influenza (35): China, LPAI H7N9, update 20130412.1641185 Avian influenza, human (41): China H7N9 update 20130412.1641464 Avian influenza (35): China, LPAI H7N9, update 20130412.1641185 Avian influenza, human (40): China H7N9 update 20130411.1638767 Avian influenza, human (39): China (SH, JS, ZH) H7N9 update
20130410.1636073
Avian influenza, human (38): China (SH, JS) H7N9 update
20130409.1633860
Avian influenza, human (35): China (SH, JS) H7N9 update
20130408.1630825
Avian influenza, human (34): China (SH, AH) H7N9, RFI
20130407.1628848
Avian influenza, human (33): vaccine development 20130407.1628472 Avian influenza, human (32): China (SH, AH) H7N9 20130407.1628294 Avian influenza, human (31): China (Shanghai) H7N9 20130406.1626812 Avian influenza, human (30): China (Hong Kong, Taiwan) H7N9, NOT
20130406.1626565
Avian influenza, human (29): China (ZH) H7N9, market quail
20130406.16264
Avian influenza, human (28): China H7N9, WHO 20130406.1626360 Avian influenza (28): China (SH) H7N9, OIE, update 20130405.1624901 Avian influenza, human (27): H7N9 update, more fatalities
20130405.1624260
Avian influenza, human (26): China H7N9 case list & map
20130404.1623110
Avian influenza, human (25): China (SH) H7N9, update 20130404.1622647 Avian influenza (27): China (SH) H7N9, avian case 20130404.1621938 Avian influenza (26): China, H7N9, RFI 20130403.0666 Avian influenza, human (24): China (ZJ) H7N9 update 20130404.1621801 Avian influenza, human (22): China (SH) H7N9, fatal: correction
20130404.1621799
Avian influenza, human (22): China (SH) H7N9 fatal 20130404.1621700 Avian influenza, human (20): China (JS) H7N9 patient details
20130403.1617279
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