Molecular detection of human H7N9 influenza A virus causing outbreaks in China

Article:
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Guest:
Dr. Leo Poon is an Associate Professor at the Centre of Influenza Research and School of Public Health, Li Ka Shing Faculty of Medicine at the University of Hong Kong.

Bob Barrett: This is the podcast from *Clinical Chemistry*. I am Bob Barrett. Recently there has been a large amount of attention on a novel human influenza A virus, the H7N9 strain, that as of May 2013, has so far sickened over 131 people and killed 31 in the People's Republic of China. Because of the potential for pandemic spread, there is a great need for rapid and accurate test for the detection of the virus.

We are fortunate to have with us today Dr. Leo Poon from the Centre of Influenza Research and School of Public Health, Li Ka Shing Faculty of Medicine at the University of Hong Kong. He and his colleagues described a new molecular diagnostic assay that allows the detection and quantification of this new H7N9 virus. The paper is available online now and will appear in the July 2013 print edition of the journal *Clinical Chemistry*.

Dr. Poon, please tell us, what is the H7N9 influenza virus and how does it differ from the H5N1 strain of flu we have heard about so much?

Dr. Leo Poon: Well, both are influenza virus, but they have different surface protein and different HA and NA. These two viruses can be found in wild birds and even in poultries as well, yet they kill people, but then they behave very differently in poultry.

So what we call H5N1, we often refer to as highly pathogenic H5N1, and it can kill poultry very quickly and then it has a high mortality rate. I mean, in terms of poultry.

But then for the low pathogenic H7N9, it didn't kill poultry that much, and basically it only caused asymptomatic infection. So that is the problem. Because if you have a flock

of bird infected with H5N1, you can see the birds are sick or poultry are sick.

But then for the low pathogenic H7N9, if you infect the poultry, you really cannot tell whether they have been infected or not. So it's difficult to tell or distinguish whether the bird has been infected by H7 or not, and that will be very difficult to control, the infection, even it can be transmitted to human.

Bob Barrett: Can you tell us a little about your new assay that's described in this paper?

Dr. Leo Poon: Right. As I mentioned before, now the H7N9 did not cause that much of a problem in poultry, I mean the poultry doesn't look sick at all. So it is very important to have a diagnostic test to detect this virus in the poultry, and also we need this assay to detect the human cases as well.

So the assay that I have developed is basically trying to develop a H7 assay which can detect the specific H7N9, but it will not cross react with other H7 virus which can be found in poultry and wild birds, or other influenza virus. So this assay is highly specific to this particular virus causing a problem in China at the moment.

Bob Barrett: Are there any vaccines or drugs that are effective for the H7N9 strain?

Dr. Leo Poon: No, unfortunately there is no vaccine available, I mean not for human use against this H7N9 infection. But there are drugs which can be able to treat the patients infected with H7N9; drugs like neuraminidase inhibitor is one of the options.

But the thing is these drugs can be only effective when we apply this to the patient at early disease onset. So that's why it is so important to have a rapid diagnostic test, which can be able to tell us whether the patient has been infected by the H7N9 or not at the early stage. So if the patient is positive for H7N9, we should try to apply these drugs to the patient as soon as possible.

Bob Barrett: I guess the biggest concern among public health officials as well as the general public is human to human transmission of diseases such as the flu. Do we know if the H7N9 virus can be transmitted among humans?

Dr. Leo Poon: There are a few clusters in China and we really don't know whether these patients have been infected by the same source or there are some limited human to human transmission. It is quite hard to say it at the moment. But one thing for sure is that, there is no sustainable human to

human transmission. So we don't do -- I mean, at least from the epidemiological data point of view, the virus is still only limited from transmitting the virus from poultry to human at the moment.

Bob Barrett: Okay. So there is no sustainable transmission among humans; the majority of these human cases I assume then did get it from poultry. How can we avoid that?

Dr. Leo Poon: Right, you are correct, because epidemiologists have suggested that poultry played a leading role in spreading the virus from bird to human in the wet market. So I think the best way to avoid it is try to have a better control of H7N9 in poultry.

First of all, if it is possible, we should try to eliminate this virus in the poultry, so a diagnostic test may be useful to try to identify the impacted poultry, or impacted flock.

And also -- I mean, we can also avoid H7N9 infections by eating properly cooked food. From what we learned in the past, human H5N1 cases sometimes may be acquired by consuming infected H5N1 meat product. So that's why if we can be able to cook the food properly, we can also reduce the risk of having H7N9 as well.

Bob Barrett: Would I be correct in saying that poultry and domesticated animals play a key role in the genesis of novel human influenza viruses, and if so, how can we do a better job to control this?

Dr. Leo Poon: Yes, you are correct. Now, we know with H5N1, it is coming from chicken and then H7N9, again, poultry playing a leading role in this.

And the thing about the pandemic H1N1 in 2009, it seems to be a mixing vessel for multiple influenza viruses. So really we need to try to have better control of influenza virus in poultry and domesticate animals, because we as humans have daily contact with this type of animals. If we can be able to control influenza virus among these populations, we would have less chance to acquire novel viral infections.

So the concept of One Health, One World is very important to control some noted infections such as influenza virus.

Bob Barrett: Dr. Leo Poon is an Associate Professor at the Centre of Influenza Research and School of Public Health, Li Ka Shing Faculty of Medicine at the University of Hong Kong. He has been our guest in this podcast from *Clinical Chemistry*.

I am Bob Barrett. Thanks for listening!