Fast and sensitive flu tracking

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Credit: AI-generated image (disclaimer)

A practical means of tracking pandemic flu in the field—using an assay known as RT-SmartAmp—was developed recently by a research team in Japan led by Toshihisa Ishikawa at the RIKEN Omics Science Center, Yokohama. In trials in Japanese hospitals and clinics, the researchers demonstrated that their rapid assay was at least as sensitive as currently available tests, easier to manage, and could provide results within 40 minutes.

The new test can be used to plot the spread of the pandemic flu A(H1N1) virus and to detect any changes in transmission mode. Similar assays, the researchers say, could be developed for monitoring other strains of influenza, such as H5N1 avian flu.

In the year after it was first reported in May 2009, the pandemic flu A(H1N1) virus was responsible for more than 200 deaths in Japan. Epidemiologists are still worried that this virus might follow the course of the 1918 Spanish flu pandemic virus, which first appeared in a relatively mild form but later returned as a more virulent strain. Widespread use of the anti-influenza drug oseltamivir may have also encouraged the increase of resistant strains of pandemic H1N1. Ishikawa and his colleagues recognized that a rapid and highly sensitive test for pandemic flu could be hugely beneficial in detecting either of these occurrences.

The RT-SmartAmp assay combines a reverse transcriptase—an enzyme which generates DNA sequences from viral RNA—with an isothermal DNA amplification reaction. The test works by detecting HA, one of the eight segments of RNA that comprise the 2009 pandemic flu virus, and the one most resistant to mutation. Since the assay requires no expensive laboratory equipment, it works in any typical medical environment.

The researchers evaluated RT-SmartAmp during the height of the 2009 pandemic flu using swab samples taken from 255 patients at three hospitals and 11 clinics in Japan. They compared the results against the best and fastest tests then available, using viral genome sequence analysis to determine whether virus was present in cases where there was a discrepancy. RT-SmartAmp was sensitive enough to detect the 2009 pandemic A(H1N1) flu virus within 24 hours of infection.

Ishikawa and colleagues hope to develop their assay further. At present, the potential of the deadly H5N1 avian flu virus to develop a capacity

for human-to-human transmission is of enormous concern. “Simple, cost-effective and highly sensitive methods to detect [H5N1] could be developed along the lines of the RT-SmartAmp assay,” Ishikawa says.

More information: Kawai, Y., et al. One-step detection of the 2009 pandemic influenza A(H1N1) virus by the RT-SmartAmp assay and its clinical validation. PLoS ONE 7, e30236 (2012)

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