INFLUENZA VACCINE FORMULA FOR THE NORTHERN WINTER 1996-1997

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The new composition of the influenza vaccines for the 1996-1997 northern season has been announced by international experts meeting at World Health Organization headquarters. Scientists are constantly challenged to identify newly emerging strains of influenza viruses, so that effective vaccines can be formulated in time. Compared with last year's recommendations, one of the three influenza vaccine components has been changed.

Influenza activity, October 1995-February 1996

Epidemics of influenza were reported between October 1995 and February 1996 in many countries in Europe, North America, and Asia. After a few reports in October 1995, influenza activity increased in November and reached a peak in December or January. By February, influenza had declined in most countries. Influenza A viruses have been widespread and caused moderate to severe epidemics affecting mainly children and young adults. European countries and China reported predominantly influenza A(H_3N_2) while influenza A(H_1N_1) caused epidemics in Canada, Japan and most regions of the United States of America.

Influenza A(H_3N_2)

The first outbreaks of influenza A(H_3N_2) were reported in boarding schools in England in September and October. The disease spread in the United Kingdom and appeared in other European countries during November and December, causing epidemics across most of the continent (Belarus, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Latvia, Netherlands, Norway, Slovakia, Spain, Sweden and United Kingdom), as well as in Madagascar and the United States. Outbreaks of influenza A(H_3N_2) started in Beijing towards the end of December and spread to six provinces in China during January. Isolates of influenza A(H_3N_2) virus were also reported in Canada, Europe (Belgium, Iceland, Ireland, Italy, Poland, Portugal, Russian Federation and Switzerland), Asia (Hong Kong, Japan and Singapore) and Oceania (Australia, Guam and New Zealand).

Influenza A(H_1N_1)

Influenza A(H_1N_1) caused a widespread epidemic in Japan and was, overall, the predominant virus in North America (Canada and the United States) and parts of Europe (Belgium, southern France and Switzerland). These viruses were also detected elsewhere in Asia (China, Hong Kong, Israel and Thailand) and Europe (Finland, Germany, Italy, Latvia, Netherlands, Poland, Romania, Russian Federation, Spain, Sweden and United Kingdom).

Influenza B

Sporadic cases of influenza B have been reported in North America (Canada and United States), in Asia (China, Hong Kong, Israel, Japan and Singapore) and

Table 1. Haemagglutination-inhibition test results of influenza A(H_3N_2) viruses

	Post-infection ferret sera			
Antigens	A / Johannesburg / 33 / 94	A / Thessalonika / 1 / 95	A / Alaska / 10 / 95	A / Wuhan / 359 / 95
A / Johannesburg / 33 / 94	**1280**	1280	160	80
A / Thessalonika / 1 / 95	640	**1280**	160	160
A / Alaska / 10 / 95	320	640	**1280**	640
A / Wuhan / 359 / 95	80	160	160	**640**
Recent isolates				
A / Johannesburg / 36 / 95	1280	1280	320	80
A / England / 409 / 95	1280	1280	320	80
A / Netherlands / 223 / 95	1280	1280	320	80
A / Idaho / 4 / 95	320	ND	320	40
A / Shenzhen / 262 / 95	160	ND	1280	640
A / New York / 95 / 96	160	ND	320	1280
A / Shanghai / 15 / 95	160	ND	640	320
A / Hong Kong / 55 / 95	160	320	ND	640
A / Singapore / 62 / 95	320	320	ND	320
A / Shanghai / 9 / 95	80	160	160	320
A / Nanchang / 7118 / 95	80	160	160	640
A / Guam / 291 / 95	160	ND	320	1280

ND = Not Done

in Europe (Belarus, Bulgaria, Finland, France, Germany, Greece, Hungary, Netherlands, Poland, Romania, Russian Federation, Sweden, Switzerland and United Kingdom). A few isolates in Oceania (Australia and New Zealand) have also been reported.

Antigenic characteristics of recent isolates

Influenza A(H_3N_2) virus

In haemagglutination-inhibition (HI) tests with post-infection ferret sera, the majority of the influenza A(H_3N_2) isolates were antigenically similar to A/Johannesburg/33/94, the vaccine strain recommended in 1995. The antigenic characteristics of a number of these isolates, including A/England/409/95 and A/Netherlands/223/95, are illustrated in the Table. In recent months, however, an increasing number of isolates were antigenically distinguishable from A/Johannesburg/33/94; in particular, viruses represented by A/Wuhan/359/95 were isolated in increasing numbers in China, Guam, Hong Kong, Singapore and the United States.

Influenza A(H_1N_1) virus

The majority of A(H_1N_1) isolates from the Americas, Asia, Europe and Oceania were closely related to A/Singapore/6/86 and A/Texas/36/91.

Influenza B virus

The influenza B viruses received for analysis, including the most recent isolates from Asia, Europe and North America, were antigenically similar to B/Beijing/184/93 and B/Harbin/7/94.

Studies with inactivated influenza virus vaccines

Antibodies to haemagglutinin were measured in the sera of vaccinees who had received trivalent inactivated vaccines containing the antigens of A/Johannesburg/33/94(H_3N_2)-like, A/Singapore/6/86(H_1N_1)-like and B/Beijing/184/93-like viruses administered in doses of 15 micrograms of each haemagglutinin.

Post-immunisation HI antibodies at titres of ≥40 against the H_3N_2 vaccine virus were detected in 54%-96% (mean 80%) of adults and 38%-96% (mean 73%) of the elderly. Similarly, post-immunisation HI antibody titres of ≥40 to representative recent isolates such as A/England/409/95, which is antigenically similar to the vaccine virus (Table), were found in 83%-100% (mean 91%) of adults and 79%-100% (mean 90%) of the elderly. The geometric mean post-vaccination titres were not significantly different from those for the vaccine virus. In contrast, post-immunisation HI antibody titres at ≥40 were observed at lower frequency to strains which showed antigenic differences from A/Johannesburg/33/94 such as A/Wuhan/359/95, A/Nanchang/7118/95, A/Shanghai/9/95, A/Shanghai/15/95 and A/Shenzhen/262/95. For example, for A/Shanghai/15/95 and A/Shenzhen/262/95, 17%-96% (mean 65%) of adults and 50%-88% (mean 64%) of elderly vaccinees had antibody at titres ≥40, and in more than 70% of tests, the geometric mean post-vaccination titres was approximately 50% lower than for the vaccine virus.

Post-immunisation HI antibodies at titres of ≥40 to the influenza A(H_1N_1) vaccine virus were detected in the sera of 56% of children, 88%-100% (mean 94%) of adults and 63%-100% (mean 81%) of elderly vaccinees. For representative recent isolates of A(H_1N_1) virus, 50%-94% (mean 70%) of children, 79%-100% (mean 92%) of adults and 67%-100% (mean 83%) of elderly vaccinees had HI titres ≥40. Geometric mean titres to the recent isolates were generally similar to those for the vaccine viruses.

For the influenza B vaccine virus, post-immunisation HI antibodies at titres of ≥40 were detected in the sera of 94% of children, 75%-100% (mean 96%) of adults and 79%-100% (mean 94%) of the elderly. Similar frequencies of antibodies to representative recent influenza B virus isolates were detected in 100% of children, 75%-100% (mean 94%) of adults and 63%-100% (mean 91%) of elderly vaccinees. Geometric mean titres to the recent isolates were generally similar to those for the vaccine virus.

Composition of northern hemisphere influenza virus vaccines

During the 1995-1996 season, influenza A(H_3N_2), A(H_1N_1) and influenza B viruses continued to circulate. In many countries, influenza A(H_3N_2) viruses were isolated from outbreaks and sporadic cases. Increasing numbers of recent isolates were antigenically heterogeneous and distinguishable from the current vaccine strain A/Johannesburg/33/94 and were similar to the recent reference strain A/Wuhan/359/95. Vaccines containing A/Johannesburg/33/94-like viruses induced serum HI antibodies at lower frequency and titre to recent variants than to the vaccine strain. Influenza A(H_1N_1) viruses circulated widely and were the predominant type in several countries. The majority of isolates were antigenically similar to the most commonly used vaccine strain, A/Texas/36/91. Sporadic isolates of influenza B virus from Asia, Europe and North America were antigenically closely related to the current vaccine viruses.

The Trivalent vaccine recommended for the 1996-1997 northern winter season is shown in the box.

Northern winter influenza vaccine formulation

- an A/Wuhan/359/95(H_3N_2)-like strain,
- an A/Singapore/6/86(H_1N_1)-like strain*, and
- a B/Beijing/184/93-like strain **.

* The most widely used vaccine strain is A/Texas/36/91.
** The most widely used vaccine strain is B/Harbin/7/94.