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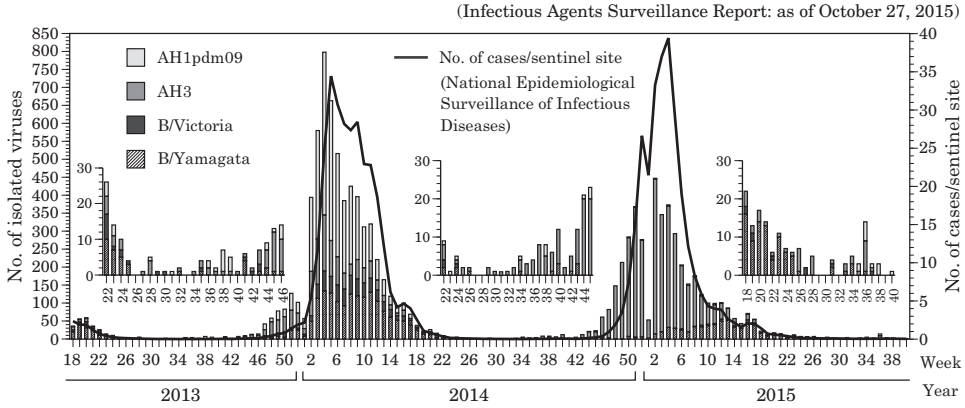
National Institute of Infectious Diseases and Tuberculosis and Infectious Diseases Control Division, Ministry of Health, Labour and Welfare

<THE TOPIC OF THIS MONTH>
Influenza 2014/15 season, Japan

Figure 1. Weekly number of reported influenza cases/sentinel site and isolated influenza viruses from week 18, 2013 to week 40, 2015, Japan

(Infectious Agents Surveillance Report: as of October 27, 2015)



The 2014/15 influenza season (week 36 in September 2014 to week 35 in August 2015), which peaked in January 2015, was characterized by the predominance of AH3, after observing relatively low AH3 activity during the previous season. From week 12 of 2015, influenza virus B was the dominant type for the remainder of the season.

Epidemiology of the 2014/15 Influenza season: Under the National Epidemiological Surveillance of Infectious Diseases (NESID), approximately 5,000 influenza sentinel sites (approximately 3,000 paediatric and 2,000 internal medicine healthcare facility sites) report patients diagnosed as influenza on a weekly basis (http://www.nih.go.jp/niid/images/iasr/34/405/de4051.pdf). In the 2014/15 season, the number of reported patients per sentinel in Japan exceeded 1.0 (indicator of the nationwide start of influenza season) in week 48 of 2014 and weekly influenza activity remained at or above this level until week 18 of 2015; the peak was the week 4 of 2015 (39.4 patients/sentinel) (Fig. 1) (http://www.nih.go.jp/niid/en/10/2096-weeklygraph/2572-trend-week-e.html). Iwate prefecture was the first prefecture to attain the alert level of 10.0 patients/sentinel/week in week 48 of 2014. In week 2 of 2015, all 47 prefectures exceeded the alert level. For the 2014/15 season, cumulatively there was a total of 289.8 patients/sentinel (301.0 patients/sentinel in the 2013/14 season).

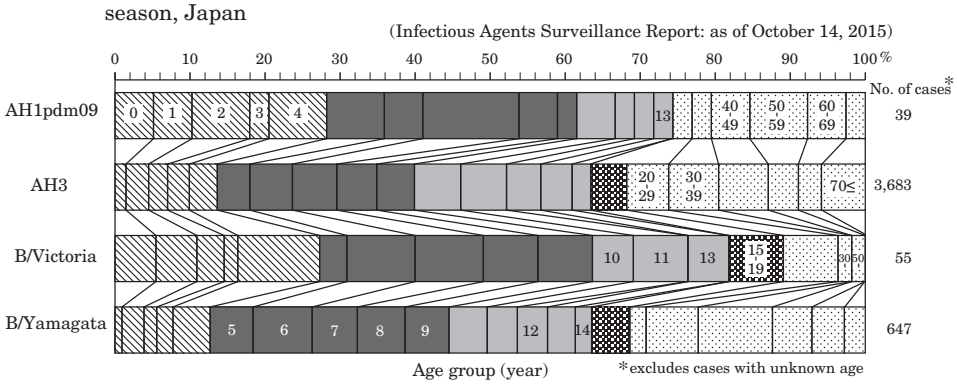
Soon after the start of the 2014/15 season, outbreaks in healthcare facilities were reported from several prefectures, such as Hiroshima prefecture (see p. 207 of this issue). Okinawa prefecture had reported influenza activity during the summer months every year since 2005; however, during the 2012/13 and 2013/14 seasons, such summer influenza activity was no longer observed. However, in the 2014/15 season, Okinawa again reported influenza activity during the summer, and was the only prefecture that continuously reported at least 1.0 influenza patient/sentinel/week from week 47 of 2014 to week 42 of 2015. In addition, Okinawa reported an influenza outbreak in a healthcare facility in July 2015 (see p. 209 of this issue).

Based on sentinel surveillance, the estimated number of medically attended influenza patients nationwide was approximately 15,030,000 from week 36 of 2014 to week 20 of 2015 (September 1, 2014-May 17, 2015). Hospitalized influenza surveillance, which collects data for hospitalized influenza patients from 500 designated sentinel hospitals with ≥300 beds (initiated in September 2011), reported a total of 12,705 hospitalized influenza patients in the 2014/15 season, which was higher than the previous season by 28% (9,905 in 2013/14) (see p. 210 of this issue). From the surveillance system for acute encephalitis, a category V notifiable

(Continued on page 200′)

(THE TOPIC OF THIS MONTH-Continued)

Figure 3. Distribution of influenza cases by age and influenza type in the 2014/15 influenza season, Japan



infectious disease, 101 influenza acute encephalitis cases (tentative statistic that is not officially final) were notified during the 2014/15 season, relative to 96 cases in the previous season (see p. 212 of this issue). In addition, during the 2014/15 season, the total number of deaths exceeded the excess mortality threshold in January 2015, with an estimated excess of 5,000 deaths (see p. 213 of this issue).

Isolation/detection of influenza virus: In the 2014/15 season, prefectural and municipal public health institutes (PHIs) reported a total of 6,170 samples with isolation/detection of influenza viruses (4,456 isolations and 1,714 detections without isolation) (Table 1 in p. 201 of this issue). Among them, 5,100 were reported from influenza sentinels, and 1,070 from the other facilities (Table 2 in p.201 of this issue).

Distribution of influenza viruses isolated/detected in the 2014/15 season was 85% AH3, 14% type B (Yamagata lineage to Victoria lineage ratio 9:1) and 1% AH1pdm09 (Table 2 in p.201 of this issue). AH3 began increasing in week 46 of 2014 and peaked in week 2 of 2015. Influenza B began increasing in week 2 of 2015 and peaked in week 12, surpassing influenza A thereafter (Figs. 1 and 2 in p. 201 of this issue). Among AH3 isolates, 26% were isolated from patients 5-9 years old and 24% from those 10-14 years old (Fig. 3 and http://www.nih.go.jp/niid/images/iasr/rapid/inf2/2015_35w/innen5e_150924.gif). Among type B isolates, 32% were isolated from patients 5-9 years old.

Antigenic characteristics of 2014/15 isolates (see p. 202 of this issue): The National Institute of Infectious Diseases (NIID) conducts antigenic analysis of isolates submitted from Japan and other Asian countries. All the 99 AH1pdm09 isolates, except two isolated in Taiwan, were antigenically similar to the 2014/15 vaccine strain A/California/7/2009. Most of the 366 AH3 isolates belonged to the genetic lineage clade 3C.2a; clades 3C.3a and 3C.3b were few. Antigenicity determined by neutralization test (the isolates' hemagglutination activity was too low for the HI test) revealed that more than 70% of the AH3 isolates were antigenically different from the 2014/15 vaccine strain A/New York/39/2012 (clade 3C.3). The 205 B/Yamagata-lineage isolates had antigenicity similar to that of the 2014/15 vaccine strain B/Massachusetts/02/2012, and all the 39 B/Victoria-lineage isolates were antigenically similar to that of the 2011/12 vaccine strain B/Brisbane/60/2008.

Antiviral resistance of 2014/15 isolates (see p. 202 of this issue): Except for one AH3 isolate that was resistant to oseltamivir and peramivir and with low sensitivity to zanamivir, 42 AH1pdm09 and 353 AH3 isolates from Japan were all sensitive to oseltamivir, zanamivir, peramivir and laninamivir. All Influenza B isolates from Japan and abroad were sensitive to all four antiviral drugs.

Immunological status of the Japanese population: Sero-surveillance for influenza has been conducted under the Preventive Vaccination Law (revised on April 1, 2013) (see p. 214 of this issue). According to approximately 7,000 serum samples collected before the 2014/15 season (from July to September in 2014), the age-group specific HI antibody positive prevalence (titer higher than 1:40) to A/California/7/2009 [A(H1N1)pdm09] was ≥75% among 10-24 year olds and <40% among 0-4 year olds and those older than 60 years. For A/New York/39/2012 [A(H3N2)], age-group specific HI antibody positive prevalence was ≥80% among 10-14 year olds, <30% among 0-4 year olds, and 40-60% among those older than 30 years; for B/Brisbane/60/2008 (B/Victoria-lineage), the seroprevalence was 50% for 40-44 year olds and <30% for those aged 0-4, 25-29 and ≥60 years.

Influenza vaccine: Approximately 33,460,000 vials (calculated as 1mL/vial) of trivalent vaccines were produced in the 2014/15 season, of which an estimated 26,490,000 vials were used for vaccination.

The 2015/16 season tetravalent vaccine consists of two strains of type A and one strain each for B/Yamagata and B/Victoria (see p. 217 of this issue). The AH1 strain was A/California/7/2009pdm09 (X-179A), same as for 2010/11-2014/15 seasons. The AH3 and influenza B/Yamagata strains were changed, respectively, to A/Switzerland/9715293/2013 (NIB-88) [previously A/New York/39/2012 (X-233A)] and B/Phuket/3073/2013 [previously B/Massachusetts/2/2012 (BX-51B)]. The newly added B/Victoria lineage strain was B/Texas/2/2013.

Conclusion: Trends in influenza activity should be monitored continuously by sentinel surveillance, school closure surveillance, hospitalized influenza surveillance and other systems. Virus isolation should be conducted throughout the year and antigenic and genetic changes should be monitored to select vaccine candidate strains. Monitoring of antiviral resistance and influenza seroprevalence in the Japanese population should also be continued. These measures are all important for future risk management measures. The epidemiology of the 2014/15 influenza season is described in http://www.nih.go.jp/niid/ja/flu-m/flutoppage/2066-ids/related/5647-fludoko-2914.html, in Japanese, and isolation and detection of influenza viruses in the 2015/16 season in see pp. 223, 224 & 225 of this issue; http://www.nih.go.jp/niid/en/iasr-inf-e.html.

The statistics in this report are based on 1) the data concerning patients and laboratory findings obtained by the National Epidemiological Surveillance of Infectious Diseases undertaken in compliance with the Law Concerning the Prevention of Infectious Diseases and Medical Care for Patients of Infections, and 2) other data covering various aspects of infectious diseases. The prefectural and municipal health centers and public health institutes (PHIs), the Department of Food Safety, the Ministry of Health, Labour and Welfare, and quarantine stations, have provided the above data.

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（特集つづき）（THE TOPIC OF THIS MONTH-Continued）

表1．インフルエンザウイルス分離・検出報告数，2011/12～2014/15シーズン
Table 1. Isolation/detection of influenza viruses during the 2011/12-2014/15 influenza seasons

型 Type	シーズン* Season* 2011/12	2012/13	2013/14	2014/15
A H1pdm09	11 (4)	109 (54)	2,847 (649)	40 (22)
A H1	-	-	-	-
A H3	3,709 (1,434)	3,667 (1,379)	1,204 (535)	3,699 (1,529)
A NT	- (14)	- (15)	- (4)	- (12)
B/Victoria	1,088 (14)	357 (28)	627 (116)	55 (8)
B/Yamagata	547 (8)	805 (31)	1,656 (278)	649 (104)
B NT	82 (304)	49 (195)	20 (272)	11 (39)
C	25 (36)	- (2)	21 (9)	2
合計 Total	5,462 (1,814)	4,987 (1,704)	6,375 (1,863)	4,456 (1,714)

A NT: A亜型未同定, B NT: B系統未同定
A NT: A not subtyped, B NT: B lineage not determined
*各シーズン(当年9月～翌年8月)に採取された検体から各地方衛生研究所で分離されたウイルス報告数, -報告なし, ( )内はウイルスは分離されていないが, 遺伝子検出または抗原検出による報告数を別掲
（病原微生物検出情報：2015年10月14日現在報告数）
*Sampling season during September through August in the following year.
( ): Nos. in parentheses denote gene or antigen detection without isolation, not included in the total.
[Infectious Agents Surveillance Report: as of October 14, 2015 from prefectural and municipal public health institutes (PHIs)]

表2．インフルエンザウイルス分離・検出報告数，2014/15シーズン
Table 2. Isolation/detection of influenza viruses during the 2014/15 influenza season

型 Type	Total (A+B)	(A)	(B)
A H1pdm09	62	49	13
A H1	-	-	-
A H3	5,228	4,297	931
A NT	12	3	9
B/Victoria	63	55	8
B/Yamagata	753	653	100
B NT	50	42	8
C	2	1	1
合計 Total	6,170	5,100	1,070

(A) インフルエンザ定点（小児科+内科） Reports from influenza sentinels (pediatric & internal medicine sites)
(B) インフルエンザ定点以外（基幹定点+その他）
Reports from sites other than influenza sentinels
A NT: A亜型未同定, B NT: B系統未同定
A NT: A not subtyped, B NT: B lineage not determined
2014年9月～2015年8月に採取された検体より各地方衛生研究所で分離・検出されたウイルス報告数、-：報告なし
（病原微生物検出情報：2015年10月14日現在報告数）
Based on samples collected from September 2014-August 2015.
(Infectious Agents Surveillance Report: as of October 14, 2015 from PHIs)

図2．都道府県別インフルエンザウイルス分離報告状況，2014/15シーズン（病原微生物検出情報：2015年10月14日現在報告数）
Figure 2. Isolation of influenza viruses by prefecture during the 2014/15 influenza season
(Infectious Agents Surveillance Report: As of October 14, 2015 from PHIs)