



Bioline™ Influenza Ultra

Influenza Virus A and B Rapid Test

About the test

[Introduction] Influenza, commonly known as “the flu,” is a highly contagious viral infection of the respiratory tract. It affects all gender and age groups, with highest incidence in children. Outbreaks tend to occur in the winter and early spring when as many as 40% of children can become infected.¹ There are three types of influenza viruses. Type A is usually responsible for the large influenza epidemics. Type A is constantly changing, with new strains emerging regularly. This results in new epidemic every few years. Type B and C are not as widespread. Type B can cause smaller, more localized outbreaks. Type C is less common and usually causes only mild illness.²

[Test principle] The Bioline™ Influenza Ultra are immobilized with mouse monoclonal anti-influenza A and anti-influenza B antibodies, respectively. And the specially selected antibodies are used as detector materials. These enable the Bioline™ Influenza Ultra to identify of influenza type A and type B antigens directly from nasopharyngeal swab or nasopharyngeal aspirate specimen, with a high degree of accuracy. The Bioline™ Influenza Ultra involves the extraction of influenza A and B viral antigens by disrupting and exposing the internal viral nucleoproteins of the patient specimen and dispensing the extraction solution on the test device.

[Intended use] The Bioline™ Influenza Ultra is an immunochromatographic assay for the differential and qualitative detection of influenza virus type A and type B antigens directly from nasopharyngeal swab or nasopharyngeal aspirate specimen. The assay is not intended to detect influenza virus type C antigens. The Bioline™ Influenza Ultra is intended for professional use and in vitro diagnostic use only.

Materials provided and active ingredients of main components

- The Bioline™ Influenza Ultra test kit contains the following items to perform the assay:
 - 10 Test devices with desiccant in individual foil pouch
 - 10 Specimen extraction tubes with assay diluent (440 µl/vial)
 - 10 Sterilized swabs for specimen collection
 - 10 Filter caps
 - 1 Influenza A positive control swab
 - 1 Influenza B positive control swab
 - 1 Influenza negative control swab
 - 1 Instructions for use
- Active ingredients of main components

1 Test device	Assay diluent
- CNB(Cellulose nano bead) Conjugates: Gallus(Chicken) IgY conjugated CNB colloid (0.0730±0.0146 µg), - Mouse monoclonal anti-influenza A virus conjugated CNB colloid (0.219±0.044µg), Mouse monoclonal anti-influenza B virus conjugated CNB colloid (0.219±0.044 µg) - Test line 1: Mouse monoclonal anti-influenza A virus (0.240±0.048 µg) - Test line 2: Mouse monoclonal anti-influenza B virus (0.320±0.064 µg) - Control line: Mouse monoclonal anti-Chicken IgY (0.320±0.064 µg)	- Tricine (0.2M) - NaCl (0.2M) - Tween 20 (0.5v/v%) - Sodium azide (q.s.) - Proclin 300 (q.s.)

Materials required but not provided

- Micropipette, Protective gloves, Timer, Biohazard container

Kit storage and stability

- The test kit should be stored at a temperature between 1°C and 30 °C. Do not freeze the kit or its components.
- The test device is sensitive to both heat and humidity. Perform the test immediately after removing the test device from the foil pouch.
- Do not use the test kit beyond its expiration date.
- The shelf life of the kit is as indicated on the outer package.
- Do not use the test kit if the pouch is damaged or the seal is broken.

Warnings

- The test devices are for in vitro diagnostic use only. Do not reuse the test device.
- The instructions must be followed exactly to achieve accurate results. Any individual performing an assay with this product must be trained in its use and must be experienced in laboratory procedures.
- Do not eat or smoke while handling specimens.
- Wear protective gloves while handling specimens and wash hands thoroughly afterwards.
- Avoid splashing or aerosol formation of specimen and assay diluent.
- Clean up spills thoroughly using an appropriate disinfectant.
- Decontaminate and dispose of all specimens, reaction kits and potentially contaminated materials in a biohazard container, as if they were infectious waste.
- Do not mix and interchange different specimens.
- Components must not be used after the expiration date printed on the labels. Do not mix or interchange different batches/lots of reagents.
- Do not drink assay diluent.
- The assay diluent contains a proprietary anti-microbial agent, sodium azide, which presents no hazard to the user if normal laboratory safety precautions are followed. If contact with assay diluent to the eyes and/or skin, wash affected area with soap and water immediately. If irritation or signs of toxicity occur, seek medical attention.
- Do not store the test kit in direct sunlight.
- To avoid cross-reactivity, do not reuse the sterilized swabs or micropipette tips for specimen collection.

Specimen collection and handling

Specimen collection

- Nasopharyngeal swab specimen
To collect a nasopharyngeal swab specimen, insert the swab into nostril parallel to the palate and hold for a few seconds to absorb secretions.
- Nasopharyngeal aspirate specimen
Transfer the specimen into a clean, dry specimen container.
Process all specimens as described in the “Test procedure” section.

Specimen storage

- Specimen should be tested as soon as possible after collection.
- If not test immediately after specimen collection, swab specimen should be extracted using assay diluent, and then the extracted solution should be refrigerated (2 - 8 °C), or stored at a temperature between 1°C and 30 °C, in a specimen container for up to 8 hours.
- If the swab specimen is not extracted immediately, swab specimen should be refrigerated (2 - 8 °C), or stored at a temperature between 1 °C and 30 °C, in a clean, dry, closed container for up to 8 hours.

Test procedure (Refer to figure)

[Specimen Extraction] Nasopharyngeal swab specimen should be extracted as following method

- Allow the test device and the specimen extraction tube with assay diluent to reach a temperature between 15 - 30 °C prior to testing.

- Insert the swab specimen into the specimen extraction tube with assay diluent and swirl the swab at least 5 times.
- Remove the swab while squeezing the tube.
- Assemble the filter cap on the specimen extraction tube.

II. Nasopharyngeal aspirate specimen

- Directly pipette 440 µl of aspirate into the specimen extraction tube with assay diluent.
- Mix specimen well.
- Assemble the filter cap on the specimen extraction tube.

[Reaction with test device]

- Remove the test device from the foil pouch prior to use.
- Assemble the filter cap and dispense 3 drops of extracted specimens vertically into the specimen well (S) on the device. Do not handle or move the test device until the test is complete and ready for reading.
⚠ Caution : If you do not hold the bottle vertically, it can lead to inaccurate results.
Read result at 5 - 8 minutes. Some positive results may appear rapidly.
- ⚠ Caution:** Do not read test results after 8 minutes. Reading too late can give false results.

Test interpretation (Refer to figure)

- Negative result:** Only green control line (C) appears.
- Positive result**
⚠ Caution: Even if the presence of faint test lines occur, the result is considered positive.

- Positive for Influenza virus A** [Two lines appear]: Red line (A) and green line (C) appear.
- Positive for Influenza virus B** [Two lines appear]: Blue line (B) and green line (C) appear.
- Positive for Influenza virus A and B** (Co-infection suspected) [Three lines appear]: Red line (A), blue line (B) and green line (C) appear.^{1,2,3}

- Invalid result:** Control line (C) fails to appear.
If the control line (C) is not visible within the result window after performing the test, the result is considered invalid. Instructions may not have been followed correctly. It is recommended that the specimen be retested using a new test kit.
Note: If the test result of the control swab is not as expected, repeat test with a new test device and extracted control solution.

Test limitations

- The contents of this kit are to be used for the differential and qualitative detection of influenza virus A and B antigen from nasopharyngeal swab or nasopharyngeal aspirate specimen. This test can differentiate between influenza virus A and B.
- Failure to follow the instructions for test procedure and interpretation of test results may adversely affect test performance and/or invalidate the test result.
- Test results must be evaluated in conjunction with other clinical data available to the physician.
- A negative test result may occur if the level of antigen in a specimen is below the detection limit of the test or if a specimen is collected improperly.

Quality control

- Internal quality control: The test device has test lines and a control line on the surface of the test device. Neither the test lines nor the control line is visible in the result window before applying a specimen. The control line is used for procedural control and should always appear if the test procedure is performed properly and the test reagents of the control line are working.
- External quality control:
 - Control procedures: Positive and negative control swabs should be tested according to the test procedure outlined in the [Specimen extraction] and [Reaction with test device] sections of these instructions.
 - Specification
 - Test result of Influenza A positive control swab should be interpreted as positive for influenza virus A. Test result of Influenza B positive control swab should be interpreted as positive for influenza virus B. Test result of Influenza negative control swab should be interpreted as negative for influenza virus A and B.

- REF 19FK13**
- Good laboratory practice suggests the use of positive and negative controls to ensure that assay diluents are working and that the test is correctly performed. Quality Control may be tested in order to conform with local, national regulations, accrediting groups, or your lab's standard Quality Control procedures.

Performance characteristics

- Study site 1
This performance testing was conducted on 402 nasopharyngeal aspirate (165 Flu A positive, 60 Flu B positive and 177 negative) and 249 nasopharyngeal swab (78 Flu A positive, 94 Flu B positive and 77 negative) specimens collected from symptomatic patients at multiple hospitals and clinics located in Japan during the 2013 - 2014 respiratory season.
Bioline™ Influenza Ultra Performance vs. Cell culture for Detection of Flu A

Test Sensitivity	Specimen type	Positive	Negative	Sensitivity	95 % CI
Nasopharyngeal aspirate (165)	155	10*	175	93.9 %	89.2 - 96.7 %
Nasopharyngeal swab (78)	69	9**	76	88.5 %	79.5 - 93.8 %

* 10 inconsistent specimens were confirmed as 9 Flu A positive and 1 negative by RT-PCR.

** 9 inconsistent specimens were confirmed as 8 Flu A positive and 1 negative by RT-PCR.

Test Specificity				
Specimen type	Positive	Negative	Specificity	95 % CI
Nasopharyngeal aspirate (177)	2*	175	98.9 %	96.0 - 99.7 %
Nasopharyngeal swab (77)	1**	76	98.7 %	93.0 - 99.8 %

* 2 inconsistent specimens were confirmed as negative by RT-PCR.

** 1 inconsistent specimen was confirmed as Flu A positive by RT-PCR.

- Bioline™ Influenza Ultra Performance vs. Cell culture for Detection of Flu B

Test Sensitivity				
Specimen type	Positive	Negative	Sensitivity	95 % CI
Nasopharyngeal aspirate (60)	55	5*	91.7 %	81.9 - 96.4 %
Nasopharyngeal swab (94)	86	8**	91.5 %	84.1 - 95.6 %

* 5 inconsistent specimens were confirmed as 4 Flu B positive and 1 negative by RT-PCR.

** 8 inconsistent specimens were confirmed as Flu B positive by RT-PCR.

Test Specificity				
Specimen type	Positive	Negative	Specificity	95 % CI
Nasopharyngeal aspirate (177)	2*	175	98.9 %	96.0 - 99.7 %
Nasopharyngeal swab (77)	1**	76	98.7 %	93.0 - 99.8 %

* 2 inconsistent specimens were confirmed as Flu B positive by RT-PCR.

** 1 inconsistent specimen was confirmed as negative by RT-PCR.

The performance of Bioline™ Influenza Ultra in nasopharyngeal aspirate and nasopharyngeal swab specimens confirmed by culture method as reference assay demonstrated that :

- In nasopharyngeal aspirate specimens : Influenza A sensitivity of 93.9 %(155/165), Influenza B sensitivity of 91.7 %(55/60), overall specificity of 97.7 %(173/177).
- In nasopharyngeal swab specimens : Influenza A sensitivity of 88.5 %(69/78), Influenza B sensitivity of 91.5 %(86/94), overall specificity of 97.4 %(75/77).

- Study site 2
This performance testing was conducted on 153 nasopharyngeal swab specimens (9 Flu A positive, 5 Flu B positive and 139 negative) collected from symptomatic patients at a hospital located in Korea during the 2014 - 2015 respiratory season.

- Bioline™ Influenza Ultra Performance vs. PCR for Detection of Flu A

Specimen type	Positive	Negative	Sensitivity	95% CI
Nasopharyngeal swab	9	0	100%	70.1-100%

Test Specificity				
Specimen type	Positive	Negative	Specificity	95% CI
Nasopharyngeal swab	0	139	100%	97.3-100%

- Bioline™ Influenza Ultra Performance vs. PCR for Detection of Flu B

Test Sensitivity				
Specimen type	Positive	Negative	Sensitivity	95% CI
Nasopharyngeal swab	5	0	100%	56.6-100%

Test Specificity				
Specimen type	Positive	Negative	Specificity	95% CI
Nasopharyngeal swab	0	139	100%	97.3-100%

The Bioline™ Influenza Ultra demonstrated sensitivity of 100% (14/14) and specificity of 100% (139/139) when compared with a reference assay, PCR.
Cross reactivity : The following 34 organisms potential cross-reacting pathogens had no effect on test results of Bioline™ Influenza Ultra. These studies had been performed to demonstrate that there have been no cross reactivity tests with bacterial and viral panels on the Bioline™ Influenza Ultra.

Bacterial		Viral	
<i>Bordetella pertussis</i>	<i>Mycoplasma pneumoniae</i>	Adenovirus Type3 (GB Strain)	Mumps Virus Ag(Enders Strain)
<i>Neisseria gonorrhoeae</i>	<i>Neisseria meningitidis</i>	Adenovirus Type6 (Tonsil 99 Strain)	Parainfluenza Type1 (KUMC-44 Strain)
<i>Escherichia coli</i>	<i>Neisseria meningitidis</i>	Adenovirus Type21 (AV-1645/128 Strain)	Parainfluenza Type 2 (KUMC-45 Strain)
<i>Haemophilus influenzae</i>	<i>Proteus vulgaris</i>	Adenovirus Type5 (Adenoid Strain)	Parainfluenza Type 3 (KUMC-46 Strain)
<i>Klebsiella pneumoniae</i>	<i>Pseudomonas aeruginosa</i>	Adenovirus Type7 (Gomen Strain)	RSV Type A (A2 Strain)
<i>Legionella pneumophila</i>	<i>Staphylococcus aureus</i>	CMV (Towne Strain)	RSV Type B (9320 Strain)
<i>Mycobacterium avium</i>	<i>Streptococcus pneumoniae</i>	HSV-1 Ag (F Strain)	HSV-1 Ag (F Strain)
<i>Mycobacterium intracellulare</i>	<i>Streptococcus pyogenes</i>	Echovirus2 (Carnelis Strain)	HSV-2 Ag (G Strain)
<i>Mycobacterium tuberculosis</i>	<i>Echovirus11</i> (Gregory Strain)		

- Interfering reactivity : The following 17 potential interfering substances had no effect on test results of Bioline™ Influenza Ultra. These studies had been performed to demonstrate that there have been no interfering reactivity on the Bioline™ Influenza Ultra.

Interfering substance			
Acetylsalicylic acid	Whole Blood	Chlorpheniramine	Oxymetazoline
Dextromethorphan hydrobromide	Acetaminophen	Diphenhydramine	Phenylephrine
Ephedrine	Guaicol glyceril ether	Ribavirin	Rimantadine (1-(1-Adamanty)ethylamine hydrochloride)
3-Acetamidophenol	Albuterol	Oseltamivir	Phenylpropanolamine
Zanamivir			

Analytical sensitivity :

- Analytical sensitivity was established using a total of 3 human epidemic strains of influenza viruses : 2 influenza A and 1 influenza B

Virus type	ATCC #	Concentration
Influenza A(H1N1)	VR-1520	1.95 x 10 ^{2.7} EID ₅₀ /0.1 ml
Influenza A(H3N2)	VR-544	1.95 x 10 ^{3.7} EID ₅₀ /0.1 ml
Influenza B	VR-101	1.95 x 10 ^{1.1} EID ₅₀ /0.1 ml

- Analytical sensitivity was established using a total of 34 other strains of influenza viruses : 7 influenza A and 4 influenza B (Human origin), 23 influenza A (Animal origin)

Human origin	Animal origin	
Virus A type	Virus A type	
A/Taiwan/1/86 (H1N1)	A/Duck/Tottori/723/80 (H1N1)	A/Gull/Maryland/704/77 (H13N6)
A/Beijing/262/95 (H1N1)	A/Duck/Hokkaido/17/01 (H2N3)	A/Mallard/Astrakhan/263/82 (H14N5)
A/New Caledonia/20/99 (H1N1)	A/Duck/Mongolia/14/03 (H13N8)	A/Duck/Australia/94/83 (H15N8)
A/Shanghai/9/93 (H3N2)	A/Duck/Czech/56 (H4N6)	A/Black-headed gull /Sweden/5/99 (H16N3)
A/Kiev/301/94 like/Johannesburg/33/94 (H3N2)	A/Duck/Pennsylvania/10218/84 (H5N2)	A/Hong Kong/483/1997 (H5N1)
A/Texas/1/77 (H1N1)	A/Duck/Massachusetts/3740/65 (H6N2)	A/Vietnam/1194/04 (H5N1)
A/Panama/2007/99 (H3N2)	A/Seal/Massachusetts/1/80 (H7N7)	A/Whooper swan/Hokkaido/4/2011 (H5N1)
	A/Turkey/Ontario/6118/68 (H8N4)	A/Muscovy duck/Vietnam/OIE-559/2011 (H5N1)
	A/Turkey/Wisconsin/66 (H9N2)	A/Turkey/Italy/4580/1999 (H7N1)
	A/Chicken/Germany/N/49 (H10N7)	A/Chicken/Netherlands/2586/2003 (H7N7)
	A/Duck/England/1/56 (H1N6)	A/Anhui/1/2013 (H7N9)
	A/Duck/Alberta/60/76 (H12N5)	
Virus B type		
B/Qingdao/102/91		
B/Hong Kong/5/72		
B/Tokio/53/99		
B/Victoria/S04/00		

- Reproducibility of Bioline™ Influenza Ultra has been demonstrated by within-run, between-run and batch-to-batch studies using 11 in-house reference panels (3 A(H1N1) type positive, 3 A(H3N2) type positive, 3 B type positive and 2 negative). All results were correspond to the acceptance criteria of each reference panel.

Bibliography of suggested reading

- Virol J. 2011 Nov 3;8:502. doi: 10.1186/1743-422X-8-502.
- Curr Microbiol. 2015 Mar;70(3):324-9. doi: 10.1007/s00284-014-0719-0. Epub 2014 Nov 1.
- Infect Genet Evol. 2014 Apr;23:95-8. doi: 10.1016/j.meegid.2014.01.032. Epub 2014 Feb 8.
- WHO - <http://www.who.int/topics/influenza/en/>
- CDC - <http://www.cdc.gov/flu/about/diseases/index.htm>

PREPARATION

- Open the package and look for the following:

- Test device with desiccant in individual foil pouch
- Specimen extraction tube with assay diluent
- Sterilized swab for specimen collection
- Filter cap
- 3 Control swabs
- Instructions for use

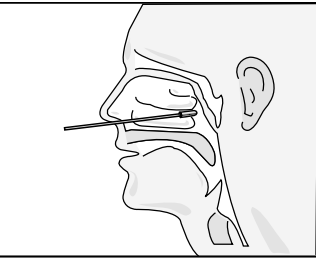
- Carefully read the instructions for using the Bioline™ Influenza Ultra test kit.

- Look at the expiration date on the back of the foil pouch. If the expiration date has passed, use another kit.

TEST PROCEDURE

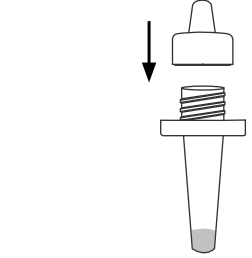
I. Nasopharyngeal swab specimen

Specimen collection method



Nasopharyngeal swab

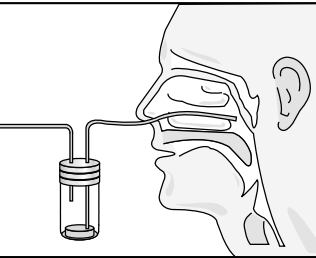
- Assemble the filter cap on the specimen extraction tube.



- Read result at 5 - 8 minutes. Some positive results may appear rapidly.
⚠ Caution : Do not read the results after 8 minutes. Reading too late can yield false results.

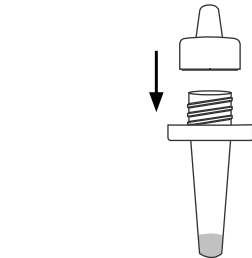
II. Nasopharyngeal aspirate specimen

Specimen collection method



Nasopharyngeal aspirate

- Assemble the filter cap on the specimen extraction tube.

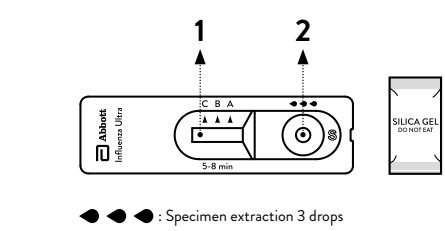


- Read result at 5 - 8 minutes. Some positive results may appear rapidly.
⚠ Caution : Do not read the results after 8 minutes. Reading too late can yield false results.

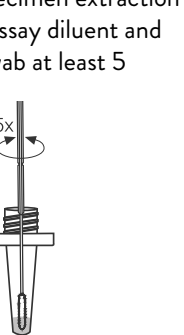
- Open the foil pouch and look for the following:

- Result window
- Specimen well

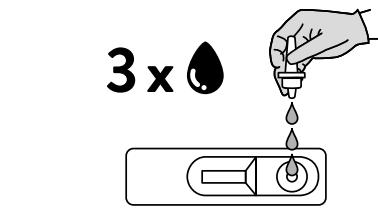
Then, label the device with the patient identifier.



Specimen collection method

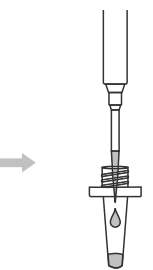


- Dispense 3 drops of extracted specimens vertically into the specimen well (S) on the device.
⚠ Caution : If you do not hold the bottle vertically, it can lead to inaccurate results.



Specimen collection method

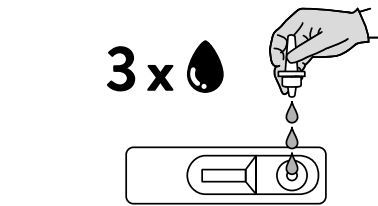
- Directly pipette 440 µl of aspirate the specimen extraction tube with assay diluent.



- Mix specimen well.

- Dispense 3 drops of extracted specimens vertically into the specimen well (S) on the device.

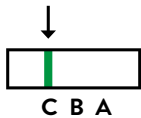
⚠ Caution : If you do not hold the bottle vertically, it can lead to inaccurate results.



Test interpretation

Negative result

Only green control line (C) appears.

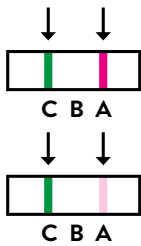


Positive result

⚠ Caution: Even if the presence of faint test lines occur, the result is considered positive.

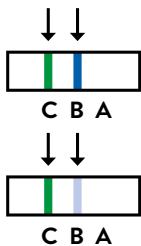
Influenza virus A [Two lines appear]

Red line (A) and green line (C) appear.



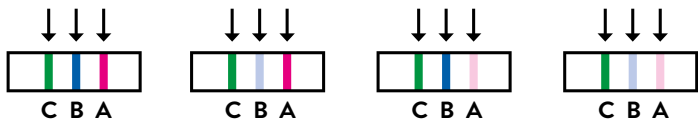
Influenza virus B [Two lines appear]

Blue line (B) and green line (C) appear.



Influenza virus A and B (co-infection suspected) [Three color lines appear]

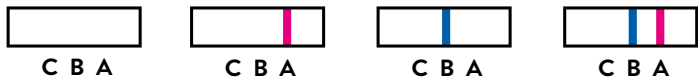
Red line (A), blue line (B) and green line (C) appear.



Invalid result

Control line (C) fails to appear.

If the control line (C) is not visible within the result window after performing the test, the result is considered invalid. Instructions may not have been followed correctly. It is recommended that the specimen be retested using a new test kit.



Glossary of symbols

IVD	For in vitro diagnostic use only	LOT	Lot Number	REF	Catalog Number
	Do not reuse		Manufacturer		Use By
	Consult instructions for use		Date of manufacture	EC REP	Authorized Representative
	Contains sufficient for X tests		Temperature limitation		CE marking according to IVD Medical Devices Directive 98/79/EC
	Do not use if package is damaged		Caution		Biological Risks
	Keep dry		Keep away from sunlight		

