# Pathflow™ Flu A/B Combi (EN)

**Instructions for Use**

## INTENDED USE

The Pathflow™ Flu A/B Combi is a rapid chromatographic immunoassay for the qualitative detection of influenza A and B antigens in nasopharyngeal swab, throat swab or nasal aspirate specimens. It is intended to aid in the rapid differential diagnosis of influenza A and B viral infections.

## SUMMARY

Influenza (commonly known as 'flu') is a highly contagious, acute viral infection of the respiratory tract. It is a communicable disease easily transmitted through the coughing and sneezing of aerosolized droplets containing live virus[1]. Influenza outbreaks occur each year during the autumn and winter months. Type A viruses are typically more prevalent than type B viruses and are associated with most serious influenza epidemics, while type B infections are usually milder. The gold standard of laboratory diagnosis is 14-day cell culture with one of a variety of cell lines that can support the growth of influenza virus[2]. Cell culture has limited clinical utility, as results are obtained too late in the clinical course for effective patient intervention. Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) is a newer method that is generally more sensitive than culture with improved detection rates over culture of 2-23%[3]. However, RT-PCR is expensive, complex and must be performed in specialized laboratories. The Pathflow™ Flu A/B Combi qualitatively detects the presence of Influenza A and/or Influenza B antigen in nasopharyngeal swab or throat swab or nasal aspirate specimens, providing results within 15 minutes. The test uses antibodies specific for Influenza A and Influenza B to selectively detect Influenza A and Influenza B antigen in nasopharyngeal swab, throat swab or nasal aspirate specimens.

## PRINCIPLE

The Pathflow™ Flu A/B Combi is a qualitative, lateral flow immunoassay for the detection of Influenza A and Influenza B nucleoproteins in nasopharyngeal swab, throat swab or nasal aspirate specimens. In this test, antibodies specific to the Influenza A and Influenza B nucleoproteins is separately coated on the test line regions of the test cassette. During testing, the extracted specimen reacts with the antibodies to Influenza A and/or Influenza B that are coated onto particles. The mixture migrates up the membrane to react with the antibodies to Influenza A and/or Influenza B on the membrane and generate one or two coloured lines in the test regions. The presence of this coloured line in either or both of the test regions indicates a positive result. To serve as a procedural control, a coloured line will always appear in the control region if the test has performed properly.

## REAGENTS

The test cassette contains anti-Influenza A and B particles and anti- Influenza A and B coated on the membrane.

## MATERIALS

Provided:

Test Cassettes, Extraction Reagent, Extraction Tubes, Sterile Swabs, Package Insert / Instructions for Use, Workstation, Extraction Tube Tips.

Not Provided:

Timer, Aspiration Device.

## WARNINGS AND PRECAUTIONS

- For professional in vitro diagnostic use only.
- Do not use after expiration date.
- The test should remain in the sealed pouch until use.
- Do not use test if pouch is damaged.
- Do not eat, drink or smoke in the area where the specimens or kits are handled.
- Handle all specimens as if they contain infectious agents. Observe established precautions against microbiological hazards throughout all procedures and follow the standard procedures for proper disposal of specimens.
- Wear protective clothing such as laboratory coats, disposable gloves and eye protection when specimens are being tested.
- The used test should be discarded according to local regulations.

## STORAGE AND STABILITY

- Store as packaged at room temperature or refrigerated (2°C-30°C).
- The test is stable through the expiration date printed on the sealed pouch.
- The test must remain in the sealed pouch until use until use.
- **DO NOT FREEZE.**
- Do not use beyond the expiration date.

## SPECIMENS

**• Nasopharyngeal Swab Sample**

Insert a sterilised swab into a nasal cavity securely from a nostril and collect mucoepidermis wiping turbinate several times.

**• Throat Swab Sample**

Insert a sterilized swab into pharynx and collect mucoeoidermis mainly wiping flare region of post-pharyngeal wall and palatine tonsil several times and be careful not to make saliva attach to the swab.

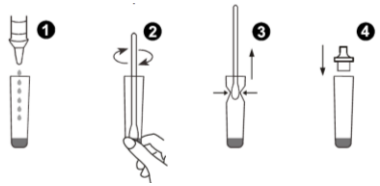
**• Nasal Aspirate**

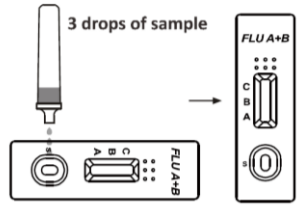
Connect an aspiration catheter to an aspiration trap that is attached to an aspiration device, insert the catheter to nasal cavity from a nostril, start the aspiration device and then collect nasal aspirate sample. Dip a sterilized swab into the collected nasal aspirate sample and make the specimen cling to the swab.

## DIRECTIONS FOR USE / INSTRUCTIONS FOR USE

**Allow the test, specimen and extraction buffer to equilibrate to room temperature (15-30°C) prior to testing.**

1. Remove the test cassette from the sealed foil pouch and use it as soon as possible. Best results will be obtained if the assay is performed immediately after opening the foil pouch.
2. Place the Extraction Tube in the workstation. Hold the extraction reagent bottle upside down vertically. Squeeze the bottle and let the solution drop into the extraction tube freely without touching the edge of the tube. Add 10 drops of solution (Approx. 400ul) to the Extraction Tube. See illustration 1.
3. Place the swab specimen in the Extraction Tube. Rotate the swab for approximately 10 seconds while pressing the head against the inside of the tube to release the antigen in the swab. See illustration 2.
4. Remove the swab while squeezing the swab head against the inside of the Extraction Tube as you remove it to expel as much liquid as possible from the swab. Discard the swab in accordance with your biohazard waste disposal protocol. See illustration 3.
5. Fit the dropper tip on top of the extraction tube. Place the test cassette on a clean and level surface. See illustration 4
6. Add three drops of the solution (approx.120ul) to the sample well and then start the timer. Read the result at 15 minutes. Do not interpret the result after 20 minutes.




## INTERPRETATION OF RESULTS

| | |
|---|---|
|  | **POSITIVE Influenza A: * Two distinct coloured lines appear**. One coloured line should be in the control region (C) and another coloured line should be in the Influenza A region (A). A positive result in the Influenza A region indicates that Influenza A antigen was detected in the sample. |
|  | **POSITIVE Influenza B: * Two distinct coloured lines appear**. One coloured line should be in the control region (C) and another coloured line should be in the Influenza B region (B). A positive result in the Influenza B region indicates that Influenza B antigen was detected in the sample. |
|  | **POSITIVE Influenza A and Influenza B: * Three distinct coloured lines appear**. One coloured line should be in the control region (C) and two-coloured line should be in the Influenza A region (A) and Influenza B region (B). A positive result in the Influenza A region and Influenza B region indicates that Influenza A antigen and Influenza B antigen were detected in the sample. |
| ***NOTE**: The intensity of the colour in the test line regions (A or B) will vary based on the amount of Flu A or B antigen present in the sample. So, any shade of colour in the test regions (A or B) should be considered positive. | |
|  | **NEGATIVE: One coloured line appears in the control region (C).** No apparent coloured line appears in the test line regions (A or B). |
|  **INVALID: Control line fails to appear.** Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test with a new test cassette. If the problem persists, discontinue using the test kit immediately and contact your local distributor. | |

## QUALITY CONTROL

Internal procedural controls are included in the test. A red line appearing in the control region (C) is an internal positive procedural control. It confirms sufficient specimen volume and correct procedural technique. A clear background is an internal negative procedural control. If the test is working properly, the background in the result area should be white to light pink and not interfere with the ability to read the test result.

Control standards are not supplied with this kit; however, it is recommended that positive and negative controls be tested as a good laboratory practice to confirm the test procedure and to verify proper test performance.

## LIMITATIONS

- The Pathflow™ Flu A/B Combi is for professional in vitro diagnostic use only. The test should be used for the detection of Influenza A and/or B virus in nasopharyngeal swab, throat swab or nasal aspirate specimens. Neither the quantitative value nor the rate of increase in Influenza A and/or B virus concentration can be determined by this qualitative test.
- The Pathflow™ Flu A/B Combi will only indicate the presence of Influenza A and/or B virus in the specimen from both viable and non-viable Influenza A and B strains.
- As with all diagnostic tests, all results must be interpreted together with other clinical information available to the physician.
- A negative result obtained from this kit should be confirmed by culture. A negative result may be obtained if the concentration of the Influenza A and/or B virus present in the nasopharyngeal swab is not adequate or is below the detectable level of the test.
- Excess blood or mucus on the swab specimen may interfere with test performance and may yield a false positive result.
- The accuracy of the test depends on the quality of the swab sample. False negatives may result from improper sample collection or storage.
- The use of over the counter and prescription nasal sprays at high concentrations can interfere with results, leading to either invalid or incorrect test results.
- A positive result for influenza A and/or B does not preclude an underlying co-infection with another pathogen, therefore the possibility of an underlying bacterial infection should be considered.

## REACTIVITY WITH HUMAN INFLUENZA STRAIN

The Pathflow™ Flu A/B Combi was tested with the following human influenza strains and a discernible line at appropriate test-line regions was observed:

| Influenza A Virus | Influenza B Virus |
|---|---|
| A/NWS/33 10(H1N1)<br>A/Hong Kong/8/68(H3N2)<br>A/Port Chalmers/1/73(H3N2)<br>A/WS/33(H1N1)<br>A/New Jersey/8/76(HswN1)<br>A/Mal/302/54(H1N1)<br>A/chicken/Yuyao/2/2006 (H5N1)<br>A/swine/Hubei/251/2001 (H9N2)<br>A/Duck/Hubei/216/1983(H7N8)<br>A/Duck/Hubei/137/1982(H10N4)<br>A/Anhui/1/2013 (H7N9) | B/R5<br>B/Russia/69<br>B/Lee/40<br>B/Hong Kong/5/72 |

## CLINICAL SENSITIVITY, SPECIFICITY AND ACCURACY

The Pathflow™ Flu A/B Combi has been evaluated with specimens obtained from the patients. RT-PCR is used as the reference method for the Pathflow™ Flu A/B Combi. Specimens were considered positive if RT-PCR indicated a positive result. Specimens were considered negative if RT-PCR indicated a negative result.

**Nasopharyngeal Swab Specimen**

| Pathflow™ Flu A/B Combi / RT/PCR | | Type A | | | Type B | | |
|---|---|---|---|---|---|---|---|
| | | RT-PCR | | Total | RT-PCR | | Total |
| | | Positive | Negative | | Positive | Negative | |
| Flu A/B Combi | Positive | 100 | 8 | 102 | 85 | 2 | 87 |
| | Negative | 1 | 180 | 181 | 2 | 200 | 202 |
| Total | | 101 | 182 | 283 | 87 | 202 | 289 |
| Relative Sensitivity | | 99.0% | | | 97.7% | | |
| Relative Specificity | | 98.9% | | | 99.0% | | |
| Accuracy | | 98.9% | | | 98.6% | | |

**Throat Swab Specimen**

| Pathflow™ Flu A/B Combi / RT/PCR | | Type A | | | Type B | | |
|---|---|---|---|---|---|---|---|
| | | RT-PCR | | Total | RT-PCR | | Total |
| | | Positive | Negative | | Positive | Negative | |
| Flu A/B Combi | Positive | 58 | 1 | 59 | 65 | 1 | 66 |
| | Negative | 3 | 150 | 153 | 4 | 162 | 166 |
| Total | | 61 | 151 | 212 | 69 | 163 | 232 |
| Relative Sensitivity | | 95.1% | | | 94.2% | | |
| Relative Specificity | | 99.3% | | | 99.4% | | |
| Accuracy | | 98.1% | | | 97.8% | | |

**Nasal Aspirate Specimen**

| Pathflow™ Flu A/B Combi / RT/PCR | | Type A | | | Type B | | |
|---|---|---|---|---|---|---|---|
| | | RT-PCR | | Total | RT-PCR | | Total |
| | | Positive | Negative | | Positive | Negative | |
| Flu A/B Combi | Positive | 46 | 2 | 48 | 94 | 1 | 95 |
| | Negative | 0 | 241 | 241 | 2 | 158 | 160 |
| Total | | 46 | 243 | 289 | 96 | 159 | 255 |
| Relative Sensitivity | | 100% | | | 97.9% | | |
| Relative Specificity | | 99.2% | | | 99.4% | | |
| Accuracy | | 99.3% | | | 98.8% | | |

## EXPECT VALUE

The Pathflow™ Flu A/B Combi has been compared with a leading commercial RT-PCR test. The correlation between these two systems is over 97%.

## PRECISION INTRA-ASSAY & INTER-ASSAY

Within-run and Between-run precision has been determined by using five specimens of Influenza standard control. Three different lots of the Pathflow™ Flu A/B Combi have been tested using negative, Influenza A weak, Influenza B Weak, Influenza A Strong and Influenza B Strong. Ten replicates of each level were tested each day for 3 consecutive days. The specimens were correctly identified>99% of the time.

## SPECIFICITY TESTING WITH VARIOUS VIRAL STRAINS

| Description | Test Level |
|---|---|
| Human adenovirus C | $5.62 \times 10^5$ TCID50/ml |
| Human adenovirus B | $1.58 \times 10^4$ TCID50/ml |
| Adenovirus type 10 | $3.16 \times 10^3$ TCID50/ml |
| Adenovirus type 18 | $1.58 \times 10^4$ TCID50/ml |
| Human coronavirus OC43 | $2.45 \times 10^6$ LD50/ml |
| Coxsackievirus A9 | $2.65 \times 10^4$ LD50/ml<br>$1.58 \times 10^5$ TCID50/ml |
| Coxsackievirus B5 | $1.58 \times 10^7$ TCID50/ml |
| Human herpesvirus 5 | $1.58 \times 10^4$ TCID50/ml |
| Echovirus 2 | $3.16 \times 10^5$ TCID50/ml |
| Echovirus 3 | $1 \times 10^4$ TCID50/ml |
| Echovirus 6 | $3.16 \times 10^6$ TCID50/ml |
| Herpes simplex virus 1 | $1.58 \times 10^6$ TCID50/ml |
| Human herpesvirus 2 | $2.81 \times 10^5$ TCID50/ml |
| Human Rhinovirus 2 | $2.81 \times 10^4$ TCID50/ml |
| Human Rhinovirus 14 | $1.58 \times 10^6$ TCID50/ml |
| Human Rhinovirus 16 | $8.89 \times 10^6$ TCID50/ml |
| Measles | $1.58 \times 10^4$ TCID50/ml |
| Mumps | $1.58 \times 10^4$ TCID50/ml |
| Sendai virus | $8.89 \times 10^7$ TCID50/ml |
| Parainfluenza virus 2 | $1.58 \times 10^7$ TCID50/ml |
| Parainfluenza virus 3 | $1.58 \times 10^8$ TCID50/ml |
| Respiratory syncytial virus | $8.89 \times 10^4$ TCID50/ml |
| Human respiratory syncytial virus | $1.58 \times 10^5$ TCID50/ml |
| Rubella | $2.81 \times 10^5$ TCID50/ml |
| Varicella-Zoster | $1.58 \times 10^3$ TCID50/ml |

**TCID50** = Tissue Culture Infectious Dose is the dilution of virus that under the conditions of the assay can be expected to infect 50% of the culture vessels inoculated.
**LD50** = Lethal Dose is the dilution of virus that under the conditions of the assay can be expected to kill 50% of the suckling mice inoculated.

## CROSS-REACTIVITY

The following organisms were tested at $1.0 \times 10^8$org/ml /ml and all found to be negative when tested with the Pathflow™ Flu A/B Combi:

| | |
|---|---|
| Arcanobacterium | Pseudomonas aeruginosa |
| Candida albicans | Staphylococcus aureus subspaureus |
| Corynebacterium | Staphylococcus epidermidis |
| Enterococcus faecalis | Staphylococcus saprophylicus |
| Enterococcus faecium | Streptococcus agalactiae |
| Escherichia coli | Streptococcus bovis |
| Haemophilus | Streptococcus dysgalatiae / subsp.dysgalatiae |
| Moraxella catarrhalis | Streptococcus oralis formerly Streptococcus |
| Neisseria gonorrhoeae | Streptococcus pneumoniae |
| Neisseria lactamica | Streptococcus pygenes |
| Nesseria subllava | Streptococcus salivarius |
| Proleus vulgaris | Streptococcus sp group F.type 2 |

## BIBLIOGRAPHY


1. Williams, KM, Jackson MA, Hamilton M. (2002) Rapid Diagnostic Testing for URIs in Children; Impact on Physician Decision Making and Cost. Infec. Med. 19(3): 109-111.
2. Betts, R.F. 1995. Influenza virus, p. 1546-1567. In G.L. Mandell, R.G. Douglas, Jr. and J.E. Bennett (ed.), Principle and practice of infectious diseases, 4th ed. Churchill Livingstone, Inc., New York, N.Y.
3. WHO recommendations on the use of rapid testing for influenza diagnosis, World Health Organisation, July 2005.


## TABLE OF SYMBOLS

| SYMBOL | DEFINITION |
|---|---|
| LOT | Batch Code/Lot Number |
| IVD | In Vitro Diagnostic Medical Device |
| REF | Catalogue Reference |
| | Upper and Lower Temperature Limit |
| | Expiry Date |
| | Manufacturer and Address Details |
| | Date of Manufacture |
| | Please consult Instructions for Use |
| Σ | Sufficient for |
| | Do not use if package is damaged |
| CE | CE Mark |
| | Caution |

This document applies to the following product codes:
M591CE / M591a / M591b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