Infectious mononucleosis (IM) is an acute, self-limited, lymphoproliferative disease caused by the Epstein-Barr virus (EBV). Infection with EBV usually occurs early in life with no recognizable disease. When primary infection is delayed until young adulthood or adolescence, however, there is about 50% chance that it will occur with the classic clinical manifestations associated with IM.1,2

The diagnosis of IM is usually based on the evaluation of characteristic clinical, hematological, and serological findings. In most cases of IM, diagnostic results can be made from the characteristic triad of fever, pharyngitis, and cervical lymphadenopathy, lasting for 1 to 4 weeks. IM may be complicated by splenomegaly, hepatitis, parotitis, or central nervous system involvement.3 Rare fatal primary infections occur in patients with hematopoietic disorders, transplant recipients, and patients with an immunocompromised state.3

The diagnosis of IM heterophile antibodies in whole blood. For finger-tip or whole blood, 25 µl test position (T) in the result window will occur only when the antibody-dye conjugate binds to the IM-specific heterophile antibody which has been bound to the extractor obtained from bovine erythrocytes. As the antibody-dye conjugate continues to move along the test membrane, it will bind to another band located at the Control position (C) to generate a colored band regardless of the presence of IM heterophile antibodies in the sample. These reagents, one at the Test position (T) and the other at the Control position (C), indicates a positive result, while the absence of a colored band at the Test position (T) indicates a negative result.

Reagents and Materials Provided
- **Status Mono** whole blood devices containing a membrane strip coated with bovine erythrocyte extract and a pad impregnated with the monoclonal mouse anti-human IgM antibody-conjugate in a protein matrix containing 0.1% sodium azide.
- **Developer Solution**: Phosphate saline buffer containing 0.1% sodium azide as preservative.
- **Package insert**
- **Procedure card**
- **10 (25 µl) sample transfer pipettes (84W10)**
- **30 (25 µl) sample transfer pipettes (84W03)**

Precautions
- **The reagents in this kit contain sodium azide. Sodium azide may react with copper to form highly explosive metal azides.** Upon disposal, flush with a large amount of water to prevent azide buildup.
- **Human blood and its products are potentially infectious; handle with appropriate precautions.**
- For in vitro diagnostic use
- Do not interchange reagents from different kit lots or use beyond the expiration date. The reagents in each kit are tested by Quality Control to function as a unit to assure proper sensitivity and maximum accuracy.
- **Use **Status Mono** whole blood test only in accordance with instructions supplied with the kit.

Storage and Stability
**Status Mono** whole blood test kit should be stored at 2° to 30°C (36°F to 86°F) in its sealed pouch. Do not freeze. The storage conditions and stability dating given under these conditions.

Specimen Collection and Preparation
- **Anticoagulant Venous Blood**: Venous blood collected over CPA1, 1heparin or EDTA can be used in this test. Mix whole blood by inversion and use the test as outlined in the Test Procedure.
  - Caution: Do not freeze & thaw whole blood; hemolyzed blood cannot be used in this test.
- **FingerBleed Blood**: For finger bleeding, prick the finger and discard the first drop. Wipe the finger and collect the second drop in the sample transfer pipettes up to the red line (25 µl). Immediately transfer the blood to the upper edge of the Sample Well (S) of the test device as outlined in the “Test Procedure”.

Storage of specimens - Whole blood can be stored between 2° to 4°C for 24 hours. If specimens are to be mailed, they should be packed in appropriate shipping containers as currently described by the carrier services for handling of potentially infectious materials.

**Procedure**
- **The test protocol must be followed in order to achieve optimal test reactivity with specimens. Follow the assay procedure and always perform the test under carefully controlled conditions.**

**References**
• Use accepted microbiological practices for proper disinfection of test equipment.
• To avoid cross-contamination, use a new disposable sample transfer pipette for each specimen.
• Label the device with the patient’s name or control number.
• To avoid contamination, disregard the tip of the Developer Solution dropper bottle to sink or swab.
• Status Mono whole blood test device.
• Use accepted microbiological practices for proper disinfection of potentially infectious test materials and contaminated equipment disposal.
• After testing, dispose of Status Mono whole blood test devices, micropipet and specimens in approved biohazard containers.

Directions For Use Of Sample Transfer Pipette

The sample transfer pipette has an air vent positioned on the sidewall of the pipette to provide automatic air venting and sample volume control.

CAUTION: Filling is automatic. Do not squeeze the sample transfer pipette while filling. Avoid air bubbles.

STEP 1

Hold the sample transfer pipette horizontally and touch the tip of the pipette to the sample. The specimen can be obtained from vacutainer, test tube or fingerstick. Capillary action will automatically draw up the correct volume to the red fill line and stop.

STEP 2

To expel sample, align the tip of the pipette over the upper area of the Sample Well (S) of the test device and squeeze the bulb.

NOTE: If a sample does not expel, hold the pipette vertically and place a finger over the vent hole. Then align the pipette tip over the upper area of the Sample Well (S) of the test device and squeeze the bulb.

Test Procedure

STEP 1

Remove a test device from its pouch and place on a flat surface.

STEP 2

Collect the sample using the 25ul sample transfer pipette for whole blood. Follow the directions for sampling using the sample transfer pipette.

STEP 3

Add 2-3 drops of Developer Solution into the lower area of the Sample Well (S). The position (C) should always appear. The test is invalid if no such band forms at the Control position (C).

STEP 4

Read the results at 8 minutes. Do not read test after 15 minutes.

Interpretation of Results

Positive

One pink-purple colored horizontal band each at the Test position (T) and at the Control position (C) indicates that IM-specific heterophile antibodies have been detected.

NOTE: A positive test result may be read as soon as a distinct pink-purple colored band appears at the Test position (T) and at the Control position (C). Any shade of pink-purple colored horizontal band at the Test position (T) should be reported as a positive result. The intensity of the colored band at the Test position (T) may be different from the intensity of the band at the Control position (C).

Negative

One pink-purple colored horizontal band at the Control position (C), with no distinct colored horizontal band at the Test position (T) other than the normal faint background color, indicates the IM-specific heterophile antibodies have not been detected.

Invalid

A distinct colored horizontal band at the Control position (C) should always appear. The test is invalid if no such band forms at the Control position (C).

Quality Control

There are two internal control features in Status Mono test. A colored control band will always appear at the Control position (C) if the test has been performed correctly and if the device is working properly. This is considered an internal positive control procedure. A clear background in the result window is considered an internal negative procedural control. If the test has been performed correctly and Status Mono device is working properly, the background in the result window will be clear, providing a distinct result.

Good laboratory practice recommends the periodic use of control materials to ensure proper kit performance. Positive and Negative controls are available from LifeSign. Positive and negative controls should be run in blood of the Results according to the Test Procedure.

If the controls do not perform as expected or the colored control band does not appear at the Control position (C), contact LifeSign LLC Technical Services immediately for assistance at 1-800-626-2125.

Limitations of the Procedure

• Status Mono whole blood test is optimized to have a minimal prozone effect. Therefore, specimens containing a very high titer of antibody may produce a somewhat weaker signal but would still produce a positive result. The test does not require any specimen dilution, but it is recommended that the specimen be diluted and retested to confirm the result if a prozone effect is suspected. The test should be used only for the qualitative detection of heterophile antibody.

• The results obtained by this kit yield data which must be used only as adjunct to other information available to the physician.

• Although most patients will have a detectable heterophile antibody level within three weeks of infection, occasionally a patient with strong clinical signs of IM may take longer than three months to develop a detectable level. If further testing is desired, collect additional specimens every few days and repeat.

• Some segments of the population who contract IM do not produce measurable levels of heterophile antibody. Approximately 50% of children under 4 years of age who have IM may test as IM heterophile antibody negative. EBV-specific laboratory diagnosis may be helpful in these cases.

• Some individuals are reported to maintain a low but persistent level of heterophile antibodies long after their primary infection. Heterophile antibodies have been detected in blood specimens taken more than one year after the onset of the illness. Such false positive test results occurring in 2-3% of patients can be excluded by EBV-specific serology.

• The IM heterophile antibody has been associated with disease states other than IM, such as leukemia, cytomegalovirus, Burkitt’s lymphoma, metastatic arthritis, adenovirus, hepatitis, and Toxoplasma gondii. In primary infections of adults with clinically atypical diseases, EBV-specific laboratory diagnosis may also be helpful.

Performance Characteristics

A total of 432 whole blood clinical samples (152 finger-tip and 280 venous blood) were tested at seven physician offices laboratory (POL), sites, a clinical reference laboratory, and in-house. Concurrently, serum or plasma samples from the same patients were obtained and tested at the same sites. The venous whole blood samples were tested with the Status Mono whole blood test kit and the corresponding serum/plasma samples were tested with Status Mono (serum/plasma) kit. Status Mono whole blood test results were compared with the Status Mono (serum/plasma) results. (Table 1)

Table 1: Total Samples (Finger-Tip and Venous)

<table>
<thead>
<tr>
<th>Status Mono</th>
<th>Positive</th>
<th>Negative</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Whole Blood</td>
<td>77</td>
<td>349</td>
<td>426</td>
</tr>
<tr>
<td>Serum/Plasma</td>
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<td>350</td>
<td>385</td>
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<tr>
<td>Total</td>
<td>112</td>
<td>799</td>
<td>911</td>
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The agreement between the two tests was 98.6% (426/432), Status Mono whole blood test demonstrated a relative sensitivity of 88.6% (349/355) and a relative specificity of 98.3% (349/355). The results obtained with Status Mono whole blood test correlated well with the results obtained with Status Mono (serum/plasma) test.

Expected Values

1. In patients with symptoms indicating IM, a positive heterophile antibody result is diagnostic, and no further testing is necessary. During the acute phase of illness, IM-specific heterophile antibodies are detectable in 85-95% of IM cases. Humoral responses to primary infections appear to be quite rapid. Moderate to high levels of heterophile antibodies are seen during the first month of illness and decrease rapidly after week four.

2. Positive test results may persist for months or even years due to the presence of persistent IM heterophile antibodies.1 This may occur with or without any clinical symptoms or hematological evidence of IM.1, 14 Conversely, a confirmed heterophile antibody test may indicate an occult infection.1, 14 In fact, detection of IM prior to onset of clinical symptoms has been reported.20, 21

3. Some patients remain persistently negative, even though there may exist hematological and clinical evidence of IM.1, 12 In some of these patients, serological evidence for a diagnosis of cytomegalovirus infection, toxoplasmosis, or viral hepatitis, as well as others, have been found.1, 12

Table 1: Total Samples (Finger-Tip and Venous)

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Also Available From LifeSign

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<td>Status Mono Waived &amp; Moderate</td>
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<td>Status HCG Urine Only</td>
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</tr>
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<td>Status H. pylori</td>
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<tr>
<td>WB Waived - Serum/Plasma Moderate</td>
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<td></td>
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</table>
Directions For Use Of Sample Transfer Pipette

The sample transfer pipette has an air vent positioned on the sidewall of the pipette to provide automatic air venting and sample volume control.

POP MATERIALS

STEP 1
Hold the sample transfer pipette horizontally and touch the tip of the pipette to skin or dropper bottle to skin or fingerstick. Capillary action will automatically draw up the correct volume to the red fill line and stop.

STEP 2
To expel sample, align the tip of the pipette over the upper area of the Sample Well (S) of the test device and squeeze the bulbs.

NOTE: If a sample does not expel, hold the pipette vertically and place a finger over the vent hole. Then align the pipette tip over the upper area of the Sample Well (S) of the test device and squeeze the bulbs.

Test Procedure

STEP 1
Remove a test device from its pouch and place on a flat surface.

STEP 2
Collect the sample using the 25µL sample transfer pipette for whole blood. Follow the directions for sampling using the sample transfer pipette.

STEP 3
Add 2-3 drops of Developer Solution into the lower area of the Sample Well (S). If a sample does not expel, hold the pipette vertically and place a finger over the vent hole. Then align the pipette tip over the upper area of the Sample Well (S) of the test device and squeeze the bulbs.

STEP 4
Read the results at 8 minutes. Do not read test after 15 minutes.

Interpretation of Results

Positive
One pink-purple colored horizontal band each at the Test position (T) and at the Control position (C) indicates that IM-specific heterophile antibodies have been detected.

Negative
One pink-purple colored horizontal band at the Control position (C), with no distinct colored horizontal band at the Test position (T) may be different from the intensity of the band at the Control position (C).

Invalid
A distinct colored horizontal band at the Control position (C) should always appear. The test is invalid if no such band forms at the Control position (C).

Quality Control

There are two internal control features in Status Mono test. A colored control band will always appear at the Control position (C) if the test has been performed correctly and if the device is working properly. This is considered an internal positive control procedure. A clear background in the result window is considered an internal negative procedural control. If the test has been performed correctly and Status Mono device is working properly, the background in the result window will be clear, providing a distinct result.

Good laboratory practice recommends the periodic use of control materials to ensure proper kit performance. Positive and Negative controls are available from LifeSign. Positive and negative controls should be run in blood of awake according to the Test Procedure.

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Limitations of the Procedure

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• The results obtained by this kit yield data which must be used only as adjunct to other information available to the physician.

• Although most patients will have a detectable heterophile antibody level within three weeks of infection, occasionally a patient with strong clinical signs of IM may take longer than three months to develop a detectable level.11 If further testing is desired, collect additional specimens every few days and retest.

• Some segments of the population who contract IM do not produce measurable levels of heterophile antibody. Approximately 50% of children under 4 years of age who have IM may test as IM heterophile antibody negative.14 EBV-specific laboratory diagnosis may be helpful in these cases.

• Some individuals are reported to maintain a low but persistent level of heterophile antibodies long after their primary illness. Heterophile antibodies have been detected in blood specimens taken more than one year after the onset of the illness.21 Such false positive test results occurring in 2-3% of patients can be excluded by EBV-specific serology.14

• The IM heterophile antibody has been associated with disease states other than IM, such as leukemia, cytomegalovirus, Burkitt's lymphoma, rheumatoid arthritis, adenovirus, viral hepatitis, and Toxoplasma gondii. In primary infections of adults with clinically atypical diseases, EBV-specific laboratory diagnosis may also be helpful.

Expected Values

1. In patients with symptoms indicating IM, a positive heterophile antibody result is diagnostic, and no further testing is necessary. During the acute phase of illness, IM-specific heterophile antibodies are detectable in 85-95% of IM cases. Humoral responses to primary infections appear to be quite rapid. Moderate to high levels of heterophile antibodies are seen within the first month of illness and decrease rapidly after week four.6

2. Positive test results may persist for months or even years due to the presence of persistent IM heterophile antibodies.20 This may occur with or without any clinical symptoms or hematological evidence of IM.17,21 Conversely, a confirmed heterophile antibody test may indicate an occult infection.14 In fact, detection of IM prior to onset of clinical symptoms has been reported.20,21

3. Some patients remain persistently negative, even though there may exist hematological and clinical evidence of IM.12,13 In some of these patients, serological evidence for a diagnosis of cytomegalovirus infection, toxoplasmosis, or viral hepatitis, as well as others, have been found.14-16

Performance Characteristics

A total of 432 whole blood clinical samples (152 finger-tip and 280 venous blood) were tested at seven physician office laboratories (POL) sites, a clinical reference laboratory, and in-house. Concurrently, serum or plasma samples from the same patients were obtained and tested at the same sites. The venous whole blood samples were tested with the Status Mono whole blood test kit and the corresponding serum/plasma samples tested with Status Mono (serum/plasma) kit. Status Mono whole blood test results were compared with the Status Mono (serum/plasma) results. (Table 1)

The agreement between the two tests was 98.6% (426/432). Status Mono whole blood test demonstrated a relative sensitivity of 98.9% (349/355) and a relative specificity of 98.3% (349/355). The results obtained with Status Mono whole blood test correlated well with the results obtained with Status Mono (serum/plasma) test. (Table 1)

Table 1: Total Samples (Finger-Tip and Venous)

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<tr>
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<td>Negative</td>
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<td>Total</td>
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Also Available From LifeSign

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<td>Status Mono Moderately Complex</td>
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<td>Status Mono Waived &amp; Moderate</td>
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<td>683640</td>
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<td>Status HCG Urine Only</td>
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<td>Status Strep A Strip Waived</td>
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<td>Status AccuStrip A - Moderate</td>
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<td>Status H. pylori</td>
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References


Symbols Key

- Instructions For Use (Read)
- Step 4
- Store At
- expiration Date
- Contents
- Developer Solution
- Test device
- Instructions For Use
- Procedure Card

Reagents and Materials Provided

- Status Mono whole blood devices containing a membrane strip coated with bovine erythrocyte extract and a pad impregnated with the monoclonal mouse anti-human IgM antibody conjugate in a protein matrix containing 0.1% sodium azide.
- Developer Solution: Phosphate saline buffer containing 0.1% sodium azide as preservative.
- Package insert
- Procedure card
- 10 (25 µl) sample transfer pipettes (84W10)
- 30 (25 µl) sample transfer pipettes (84W93)

Precautions

- The reagents in this kit contain sodium azide. Sodium azide may react with specific conditions to form highly explosive metal azides. Upon disposal, flush with a large amount of water to prevent azide buildup.
- Human blood and its products are potentially infectious; handle with appropriate precautions.
- For in vitro diagnostic use
- Do not intermix reagents from different kit lots or use beyond the expiration date. The reagents in each kit are tested by Quality Control to function as a unit to assure proper sensitivity and maximum accuracy.
- Use Status Mono whole blood test only in accordance with instructions supplied with the kit.

Storage and Stability

- Status Mono whole blood test kit should be stored at 2°- 8°C (35°- 86°F) in its sealed package. Do not freeze. The storage conditions and stability dating given vary under test kit storage conditions.

Specimen Collection and Preparation

a. Anticoagulated Venous Blood: Venous whole blood collected over CPDA-1, heparin or EDTA can be used in this test. Mix whole blood by inversion and use the test as outlined in the Test Procedure.

b. Fingertip Blood: Fingertip blood, prick the finger and discard the first drop. Wipe the finger and collect the second drop in the sample transfer pipettes up to the red fill line (25 µl). Immediately transfer the blood to the upper end of the Sample Well (S). The developer solution is then added in Sample Well (S). As the specimen, followed by the developer, moves by capillary action to the antigen band, the solution mobilizes the dye conjugated to anti-human IgM antibodies. If an anti-specific heterophile antibody is present in the specimen, it will be captured by the antigen band (bovine erythrocyte extracts) in the test membrane. Visualization of the antigen band at the Test position (T) in the result window will occur only when the antibody-dye conjugate binds to the IM-specific heterophile antibody which has been bound to the extracted antigen obtained from bovine erythrocytes. As the antibody-dye conjugate continues to move along the test membrane, it will bind to another band located at the control position (C) to generate a colored band regardless of the presence of IM heterophile antibodies in the sample. The bands, one at the Test position (T) and the other at the Control position (C), indicates a positive result, while the absence of a colored band at the Test position (T) indicates a negative result.

The procedure to be followed in order to achieve optimal test reactivity with specimens. Follow the assay procedure and always perform the test under carefully controlled conditions.

Procedures

- The test protocol must be followed in order to achieve optimal test reactivity with specimens. Follow the assay procedure and always perform the test under carefully controlled conditions.