

## Rapid Response™

### Hepatitis B Virus Combo Test Cassette (Serum/Plasma)

REF HBV-12C5-25

Product Insert

#### A rapid test for the qualitative detection of Hepatitis B Surface Antigen (HBsAg), Hepatitis B Surface Antibody (HBsAb), Hepatitis B Envelope Antigen (HBeAg), Hepatitis B Envelope Antibody (HBeAb), and Hepatitis Core Antibody (HBcAb) in human serum and plasma.

For professional *in vitro* diagnostic use only.

### Intended Use

The Rapid Response™ Hepatitis B Virus Combo Test Cassette is a rapid chromatographic immunoassay for the qualitative detection of HBsAg, HBsAb, HBeAg, HBeAb and HBcAb in serum or plasma.

### Summary

Chronic hepatitis B is a serious, debilitating illness that can cause cirrhosis of the liver, liver cancer and death. Chronic hepatitis B is the main cause of liver cancer and the tenth leading cause of death worldwide, with 400,000,000 people infected with the virus. Every year, one million people worldwide are expected to die from this infection.

Most people fight off the infection themselves, but approximately 5-10 percent of those infected with the virus become carriers, and an additional 5-10 percent of those infected each year will progress to chronic liver disease, cirrhosis and possibly liver cancer.

The Rapid Response™ Hepatitis B Virus Combo Test Cassette is a rapid test to qualitatively detect the presence of HBsAg, HBsAb, HBeAg, HBeAb and HBcAb in serum plasma without the use of an instrument.<sup>1</sup>

### Principle

#### HBsAg and HBeAg

The HBsAg and HBeAg tests are qualitative, two-site sandwich immunoassays for the detection of HBsAg or HBeAg in serum or plasma. The membrane is pre-coated with anti-HBsAg or anti-HBeAg antibodies on the test line region of the strip. During testing, the serum or plasma specimen reacts with the particle coated with anti-HBsAg or anti-HBeAg antibodies.<sup>2</sup> The mixture migrates upward on the membrane chromatographically by capillary action to react with anti-HBsAg or anti-HBeAg antibodies on the membrane and generate a colored line. The presence of this colored line in the test line region indicates a positive result, while its absence indicates a negative result.

#### HBsAb

Hepatitis B surface Antibody (HBsAb) is also known as anti-

Hepatitis B surface Antigen (anti-HBs). This test is a qualitative, lateral flow immunoassay for the detection of HBsAb in serum or plasma. The membrane is pre-coated with HBsAg on the test line region of the strip. During testing, the serum or plasma specimen reacts with the particle coated with HBsAg. The mixture migrates upward on the membrane chromatographically by capillary action to react with HBsAg on the membrane and generate a colored line. The presence of this colored line in the test line region indicates a positive result, while its absence indicates a negative result.

#### HBeAb and HBcAb

Hepatitis B envelope Antibody (HBeAb) is also known as anti-Hepatitis B envelope Antigen (anti-HBe). Hepatitis B core Antibody (HBcAb) is also known as anti-Hepatitis B core Antigen (anti-HBc). These tests are immunoassays based on the principle of competitive binding.

During testing, the mixture migrates upward on the membrane chromatographically by capillary action. The membrane is pre-coated with HBeAg or HBcAg on the test line region of the strip. During testing, anti-HBe antibody or anti-HBc antibody, if present in the specimen, will compete with particle coated anti-HBe antibody or anti-HBc antibody for limited amount of HBeAg or HBcAg on the membrane, and no line will form in the test line region, indicating a positive result. A visible colored line will form in the test line region if there is no anti-HBe antibody or anti-HBc antibody in the specimen because all the antibody coated particles will be captured by the antigen coated in the test line region.

To serve as a procedural control, a colored line will always appear in the control line region indicating that proper volume of specimen has been added and membrane wicking has occurred.

### Reagents

The test cassette contains anti-HBsAg particles, HBsAg particles, anti-HBeAg particles, HBcAg particles respectively and anti-HBsAg, HBsAg, anti-HBeAg, Anti-HBcAg coated on the membrane respectively.

### Precautions

#### Please read all the information in this package insert before performing the test.

1. For professional *in vitro* diagnostic use only. Do not use after the expiration date.
2. Do not eat, drink or smoke in the area where the specimens or kits are handled.
3. Hand all specimens as if they contain infectious agents. Observe established precautions against microbiological hazards throughout testing and follow the standard procedures for proper disposal of specimens.
4. Wear protective clothing such as laboratory coats, disposable gloves and eye protection when specimens are

being tested.

5. Humidity and temperature can adversely affect results.

### Materials

#### Materials provided

- Test cassettes
- Droppers
- Product insert

#### Materials required but not provided

- Specimen collection containers
- Timer

### Storage and Stability

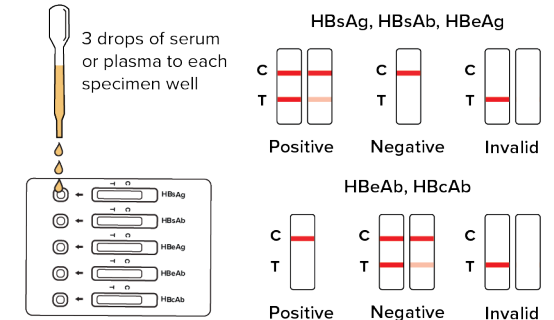
Store as packaged at room temperature or refrigerated (35.6-86°F; 2-30°C). The test cassette is stable through the expiration date printed on the sealed pouch. The test must remain in the sealed pouch until use. **DO NOT FREEZE.** Do not use beyond the expiration date.

### Specimen Collection and Preparation

- The Rapid Response™ Hepatitis B Virus Combo Test Cassette can be performed using either serum or plasma.
- Separate serum or plasma from blood as soon as possible to avoid hemolysis. Use only clear, non-hemolyzed specimens.
- Testing should be performed immediately after specimen collection. Do not leave the specimens at room temperature for prolonged periods. Serum and plasma specimens may be stored at 35.6-46.4°F (2-8°C) for up to 3 days. For long term storage, specimens should be kept below -4°F (-20°C).
- Bring specimens to room temperature prior to testing. Frozen specimens must be completely thawed and mixed well prior to testing. Specimens should not be frozen and thawed repeatedly.
- If specimens are to be shipped, they should be packed in compliance with federal regulations covering the transportation of etiologic agents.

### Test Procedure

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 within one hour.
2. Place the test cassette on clean and level surface. Hold the dropper vertically and transfer 3 full drops of serum or plasma (approx. 75µl) to each sample well of the test cassette respectively, then start the timer. Avoid trapping air bubbles in the specimen well. See the illustration below.
3. Wait for the red line to appear. The result should be read at 15 minutes. Do not interpret the results after 20 minutes.

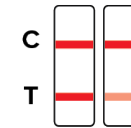


### Results Interpretation

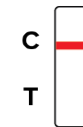
**WARNING:** Do not interpret all 5 tests with the same criterion. Carefully follow the directions below.

#### HBsAg, HBsAb, HBeAg

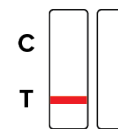
**POSITIVE:** \* Two colored lines appear. One colored line should be in the control region (C) and another colored line should be in the test region (T).



**\*NOTE:** The intensity of the color in the test line region (T) will vary depending on the concentration of HBsAg, HBsAb, HBeAg present in the specimen. Therefore, any shade of color in the test region (T) should be considered positive.

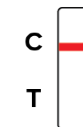


**NEGATIVE:** One colored line appears in the control region (C). No apparent colored line appears in the test region (T).

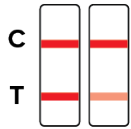


**INVALID:** Control line fails to appear. Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test with a new test cassette. If the problem persists, discontinue using the test kit immediately and contact your local distributor.

#### HBeAb, HBcAb

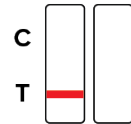


**POSITIVE:** One colored line appears in the control region (C). No apparent colored line appears in the test region (T).



**NEGATIVE:** \* Two distinct colored lines appear. One colored line should be in the control region (C) and another colored line should be in the test region (T).

\*NOTE: The intensity of the color in the test line region (T) may vary. But it should be considered negative whenever there is even a faint pink line.



**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

A procedural control is included in the test. A red line appearing in the control line region (C) is the internal procedural control. It confirms sufficient specimen volume and correct procedural technique.

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

### Limitations

1. The Rapid Response™ Hepatitis B Virus Combo Test Cassette is for professional *in vitro* diagnostic use only. The test should be used for the detection of HBsAg, HBsAb, HBeAg, HBeAb and HbCAb in serum or plasma specimen. Neither the quantitative value nor the rate of HBsAg, HBsAb, HBeAg, HBeAb, HbCAb concentration can be determined by this qualitative test.
2. The Rapid Response™ Hepatitis B Virus Combo Test Cassette will only indicate the presence of HBsAg, HBsAb, HBeAg, HBeAb and HbCAb in the specimen and should not be used as the sole criteria for the diagnosis of Hepatitis B viral infection.
3. As with all diagnostic tests, all results must be considered with other clinical information available to the physician.

### Performance Characteristics

#### Sensitivity and Specificity

The Rapid Response™ Hepatitis B Virus Combo Test Cassette was compared with leading commercial EIA/RIA HBsAg, HBsAb, HBeAg, HBeAb, HbCAb tests, the results show that the Rapid

Response™ Hepatitis B Virus Combo Test Cassette has a high sensitivity and specificity.

#### HBsAg

| Method  | Results  | EIA      |          | Total Results |
|---|----------|----------|----------|---------------|
|   |          | Positive | Negative |               |
| HBsAg Rapid Response™ Hepatitis B Virus Combo Test Cassette | Positive | 241      | 2        | 243           |
|   | Negative | 0        | 359      | 359           |
| Total Results   |          | 241      | 361      | 602           |

Relative Sensitivity: >99.9% (95%CI\*: 98.8%-100%)

Relative Specificity: 99.4% (95%CI\*: 98.0%-100%)

Accuracy: 99.7% (95%CI\*: 98.8%-100%)

\*Confidence Intervals

#### HBsAb

| Method  | Results  | EIA      |          | Total Results |
|---|----------|----------|----------|---------------|
|   |          | Positive | Negative |               |
| HBsAb Rapid Response™ Hepatitis B Virus Combo Test Cassette | Positive | 194      | 9        | 203           |
|   | Negative | 7        | 391      | 398           |
| Total Results   |          | 201      | 400      | 601           |

Relative Sensitivity: 96.5% (95%CI\*: 93.0%-98.6%)

Relative Specificity: 97.8% (95%CI\*: 95.8%-99.0%)

Accuracy: 97.3% (95%CI\*: 95.7%-98.5%)

\*Confidence Intervals

#### HBeAg

| Method  | Results  | EIA      |          | Total Results |
|---|----------|----------|----------|---------------|
|   |          | Positive | Negative |               |
| HBeAg Rapid Response™ Hepatitis B Virus Combo Test Cassette | Positive | 154      | 9        | 163           |
|   | Negative | 6        | 429      | 435           |
| Total Results   |          | 160      | 438      | 598           |

Relative Sensitivity: 96.3% (95%CI\*: 92.1%-98.6%)

Relative Specificity: 97.9% (95%CI\*: 96.1%-99.1%)

Accuracy: 97.5% (95%CI\*: 95.9%-98.6%)

\*Confidence Intervals

#### HBeAb

| Method  | Results  | EIA      |          | Total Results |
|---|----------|----------|----------|---------------|
|   |          | Positive | Negative |               |
| HBeAb Rapid Response™ Hepatitis B Virus Combo Test Cassette | Positive | 146      | 7        | 153           |
|   | Negative | 4        | 329      | 333           |
| Total Results   |          | 150      | 336      | 486           |

Relative Sensitivity: 97.3% (95%CI\*: 93.3%-99.3%)

Relative Specificity: 97.9% (95%CI\*: 95.8%-99.2%)

Accuracy: 97.7% (95%CI\*: 96.0%-98.9%)

\*Confidence Intervals

#### HbCAb

| Method  | Results  | EIA      |          | Total Results |
|---|----------|----------|----------|---------------|
|   |          | Positive | Negative |               |
| HbCAb Rapid Response™ Hepatitis B Virus Combo Test Cassette | Positive | 358      | 4        | 362           |
|   | Negative | 8        | 167      | 175           |

|               |     |     |     |
|---------------|-----|-----|-----|
| Total Results | 366 | 171 | 537 |
|---------------|-----|-----|-----|

Relative Sensitivity: 97.8% (95%CI\*: 95.7%-99.1%)

Relative Specificity: 97.7% (95%CI\*: 94.1%-99.4%)

Accuracy: 97.8% (95%CI\*: 96.1%-98.8%)

\*Confidence Intervals

#### Precision

##### Intra-Assay

Within-run precision has been determined by using 15 replicates of three specimens containing negative, low positive, high positive of HBsAg, HBsAb, HBeAg, HBeAb, HbCAb. The negative and positive values were correctly identified 99% of the time.

##### Inter-Assay

Between-run precision has been determined by using the same three specimens of negative, low positive, high positive of HBsAg, HBsAb, HBeAg, HBeAb, HbCAb in 15 independent assays. Three different lots of the Rapid Response™ Hepatitis B Virus Combo Test Cassette has been tested over a 10 days period using negative, low positive and high positive specimens. The specimens were correctly identified 99% of the time.

#### Cross-reactivity

The Rapid Response™ Hepatitis B Virus Combo Test Cassette has been tested by HAMA, Rheumatoid factor (RF), HAV, Syphilis, HIV, H. Pylori, MONO, CMV, Rubella and TOXO positive specimens. The results showed no cross-reactivity.

#### Interfering Substances

The Rapid Response™ Hepatitis B Virus Combo Test Cassette has been tested for possible interference from visibly hemolyzed and lipemic specimens. No interference was observed.

In addition, no interference was observed in specimens containing up to 2,000 mg/dL Hemoglobin, 1000 mg/dL Bilirubin, and 2000 mg/dL human serum Albumin.

### Bibliography

1. Chizzali-Bonfadin C., Adlassnig K.P., Kreihsl M., Hatvan A., Horak W., Knowledge-based interpretation of serologic tests for hepatitis on the World Wide Web. Clin Perform Qual HealthCare 1997 Apr-Jun 5:61-3
2. ter Bog F., ten Kate F.J., Cuyper H.T., Leentvaar-Kuipers A., Oosting J., Wertheim-van Dillen P.M., Honkoop P, Rasch M.C., de Man R.A., van Hattum J., Chamelueau R.A., Reesink H.W., Jones E.A., Relation between laboratory results and histological hepatitis activity in individuals positive for hepatitis B surface antigen and antibodies to hepatitis B e antigen, Lancet 1998 June 351:1914-8

### Glossary of Symbols

|  |                                  |  |   |  |              |
|--|----------------------------------|--|---|--|--------------|
|  | Consult instructions for use     |  | Test per Kit                            |  | Do Not Reuse |
|  | Store between 35.6°F to 86°F     |  | Use by                                  |  | Catalogue #  |
|  | Lot Number                       |  | For <i>in vitro</i> diagnostic use only |  | Manufacturer |
|  | Do not use if package is damaged |  |   |  |              |

**BTNX Inc.**  
722 Rosebank Road,  
Pickering, ON L1W 4B2  
Canada



**Technical Support: 1-888-339-9964**