

# AmiShield® Liver Plus Panel

For Veterinary Use Only

For Professional Use Only

Catalog Number : 001-3AEA (For VCA-TE-100)

001-3AEC (For VCA-TE-300)

-----Please follow the instructions before use-----

## Intended use

The disposable AmiShield® Liver Plus Panel in conjunction with the AmiShield® Veterinary Clinical Analyzer utilizes dry and liquid reagents to provide quantitative determinations of albumin (ALB), alkaline phosphatase (ALP), alanine aminotransferase (ALT), aspartate aminotransferase (AST), blood urea nitrogen (BUN), total bilirubin (TBIL) and total protein (TP), gamma glutamy transferase (GGT). At the same time through the calculation, can get the other two parameters (GLOB, ALB/ GLOB) information. After each test, biochemical test results can be obtained 10 to provide a basis for rapid diagnosis in lithium heparinized whole blood, lithium heparinized plasma or serum.

## Clinical Significance

The disposable AmiShield® Liver Plus Panel and the AmiShield® Veterinary Clinical Analyzer assist the veterinarian in diagnosing the following disorders:

Albumin (ALB): Hepatic and kidney diseases

Alkaline phosphatase (ALP): Hepatic, bone, parathyroid and intestinal diseases

Alanine aminotransferase (ALT): Hepatic (viral hepatitis and cirrhosis) and cardiac diseases

Aspartate aminotransferase (AST): Hepatic diseases, including viral hepatitis and cirrhosis;  
cardiac diseases

Blood urea nitrogen (BUN): Hepatic and kidney diseases

Total bilirubin (TBIL): Hepatic disorders

Total protein (TP): Dehydration, kidney, hepatic disease, metabolic and nutritional disorders

Gamma glutamyl transferase (GGT): Bile duct disease

Globulin (GLOB) (calculated): Liver function

Albumin/Globulin (ALB/ GLOB) (calculated): an important indicator of viral hepatitis and  
cirrhosis

As with any diagnostic test procedure, the clinical samples or other test procedures should be considered prior to final diagnosis

## Principles of Procedures

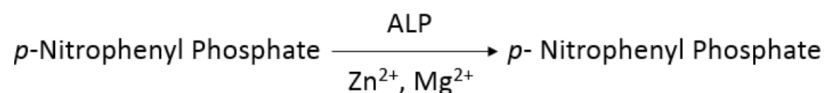
### (1) Albumin (ALB)

Dye-binding method is used to detect the quantity of albumin. Albumin is bound by the Bromocresol green (BCG) dye to produce an increase in the blue-green color measured at 620 nm. The color increase is proportional to the concentration of albumin present.



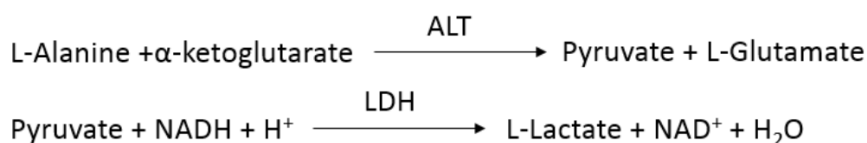
### (2) Alkaline Phosphatase (ALP)

The detection method is based on the recommended method of AACC. The p-Nitrophenyl phosphate (p-NPP) is hydrolyzed to p-nitrophenol (p-NP) and inorganic phosphate by ALP catalyzation. The rate at which the p-NPP is hydrolyzed, measured at 405 nm, is directly proportional to the ALP activity.



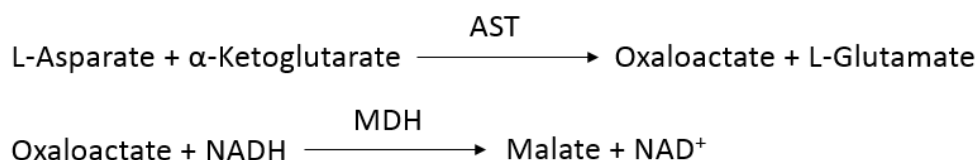
### (3) Alanine Aminotransferase (ALT)

The detection procedure is based on IFCC Method. Alanine aminotransferase (ALT) catalyzes the transfer of the amino group from L-alanine to  $\alpha$ -Ketoglutarate to yield pyruvate and L-glutamate. The pyruvate undergoes reduction with simultaneous oxidation of NADH to NAD in the LDH catalyzed indicator reaction. The resulting rate of decrease in absorbance at 340 nm is directly proportional to the ALT activity.



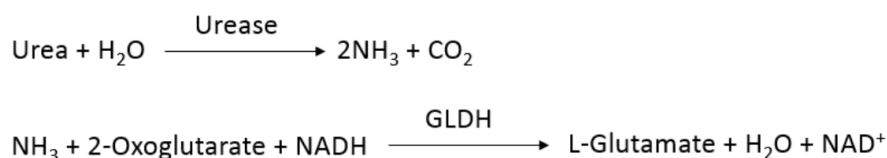
### (4) Aspartate Aminotransferase (AST)

The detection method is a modification method based on IFCC Method. Aspartate aminotransferase (AST) catalyzes the transfer of the amino group from L-aspartate and  $\alpha$ -ketoglutarate to yield oxaloacetate and L-glutamate. The oxaloacetate undergoes reduction with simultaneous oxidation of NADH to NAD in the malate dehydrogenase (MDH) catalyzed indicator reaction. The resulting rate of decrease in absorbance at 340 nm is directly proportional to the AST activity. Lactate dehydrogenase (LDH) is added to the reaction to prevent the interference from endogenous pyruvate which is normally present in serum.



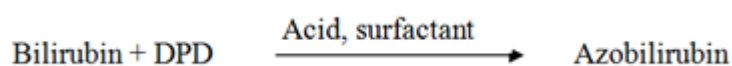
#### (5) Urea Nitrogen (BUN)

Urea is hydrolyzed by urease to produce ammonia and carbon dioxide. The liberated ammonia reacts with  $\alpha$ -ketoglutarate and NADH in the presence of enzyme glutamate dehydrogenase to yield glutamate and NAD. NADH undergoes oxidation during the reaction resulting in a decrease in absorbance at 340 nm that is directly proportional to the urea nitrogen concentration in the sample.



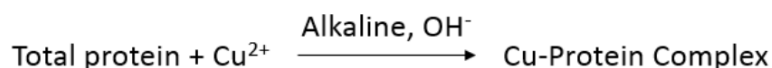
#### (6) Total Bilirubin (TBIL)

Total Bilirubin is coupled with a diazonium salt (DPD) in a strongly acid medium. The intensity of the color of the azobilirubin produced is proportional to the TBIL concentration and can be measured photometrically.



#### (7) Total Protein (TP)

The detection method is based on biuret reaction. Protein is coupled with cupric ions Cu(II) in a strongly alkaline solution to form a violet colored complex. The intensity of the color is proportional to the protein concentration.



#### (8) Gamma glutamyl transferase (GGT)

The detection method is a modification method based on IFCC Method. The addition of sample containing gamma glutamyl transferase to the substrates L- $\gamma$ -glutamyl-3-carboxy-4-nitroabilide and glycylglycine(gly-gly) causes the formation of L- $\gamma$ -glutamyl-glycylglycine(gly-gly-gly) and 3--carboxy-4-nitroabilid.

The production of 3--carboxy-4-nitroabilid is proportional to the GGT activity in the sample.



### Storage

1. Store the rotor that sealed in their foil pouches at 2 – 8 °C (36 – 46 °F). When stored as described above, all reagents in the rotor are stable until the expiration

- date which printed on the rotor foil pouch.
2. Do not expose opened or unopened rotor to direct sunlight or temperatures above 30 °C (86 °F).
  3. Do not use a rotor after the expiration date.
  4. Do not use a rotor from a damaged foil pouch. Because, a torn or otherwise damaged foil pouch may lead moisture to reach the unused rotor and adversely affect reagent performance.

### **Materials Required but not Provided**

1. AmiShield® Veterinary Clinical Analyzer
2. Sample collector
3. Pipette and tip
4. Controls

### **Instructions for Reagent Handling**

1. The rotor should be used for assay immediately following take out from refrigerator.
2. Open the sealed foil pouch and remove carefully the rotor. Don't touch the barcode located on the top of the rotor. The contaminated or scratched barcode will not be scanned by analyzer.
3. The rotor should be used within 20 minutes after opening the pouch. The rotor in opened pouches can't be placed back into the refrigerator for reuse.
4. The rotor would be firmly pressed onto the spindle of AmiShield® Veterinary Clinical Analyzer.
5. **Transfer 0.14 mL (140 µL) sample** to rotor inlet through the sample port by pipette.
6. **Use only lithium heparinized whole blood, plasma or serum.**
7. The analyzer maintains the rotor at a temperature of 37 °C over the measurement interval. The analysis time is about 13-15 minutes. In addition, the AmiShield® System operates at ambient temperatures between 15°C and 30°C.

### **Sample Collection and Preparation**

1. The minimum required sample size is 0.14 mL (140 µL) of lithium heparinized whole blood/plasma/serum or control.
2. Use no-additive (red stopper) evacuated specimen collection tubes or serum separator tubes (yellow or red/yellow stopper) for serum samples. Use only lithium heparin (green stopper) evacuated specimen collection tubes for whole blood/plasma samples.
3. Whole blood samples obtained by venipuncture must be homogenous. Gently invert the collection tubes several times just prior to sample transfer. Do not

shake the collection tube. Shaking may cause hemolysis.

4. Release both the needle of syringe and the stopper of collection tube before transferring whole blood sample to collection tube.
5. The test must be started once sample is transferred into the rotor. A long delay time may affect the analytical performance.
6. Lithium heparinized whole blood samples should be run within 60 minutes of collection; if this is not possible, separate the sample and transfer it into a clean test tube. Run the separated plasma or serum sample within 5 hours of centrifugation. If this is not possible, refrigerate the sample in a stoppered test tube at 2 – 8 °C (36 – 46 °F) for no longer than 48 hours.

### **Precautions**

- Wear a laboratory coat and gloves to avoid the biohazard and puncture injury.
- The medical waste should be disposed following the local regulations.
- See the AmiShield® Veterinary Clinical Analyzer Operator's Manual for complete information on using the analyzer.

### **Warnings**

1. When rotor embeds onto the spindle the diluent container is open. A rotor with an opened diluent container can't be reused. Ensure that the sample or control has been placed into the rotor before running the test.
2. The AmiShield® products used only with the AmiShield® Veterinary Clinical Analyzer, vice versa. Before START the test, please confirm the rotor is properly and evenly embedded into the spindle, in addition, the assembled holder should be well placed on the spindle in the Analyzer.
3. Please avoid colliding or falling damages. In this case, the rotor can't be used.
4. Reagents in the rotor may contain acids or caustic substances. The operator does not come into contact with the reagents when following the recommended procedures. In the event that the reagents are handled (e.g., cleaning up after dropping and cracking a rotor), avoid ingestion, skin contact, or inhalation of the reagents.
5. Some reagents contain sodium azide, which may react with lead and copper plumbing to form highly explosive metal azides. Reagents will not come into contact with lead and copper plumbing when following recommended procedures. However, if the reagents do come into contact with such plumbing, flush with a large volume of water to prevent azide buildup.

### **Quality Control and Calibration**

1. The AmiShield® Veterinary Clinical Analyzer is calibrated by the manufacturer before shipment.
2. The barcode printed on the upper cover provides the analyzer with

rotor-specific calibration data.

3. Controls may be run periodically on the AmiShield® Veterinary Clinical Analyzer to verify the accuracy of the analyzer by user.
4. A control is only available from producer. Run controls on the rotor in the same manner as for patient samples. See the AmiShield® Veterinary Clinical Analyzer Operator's Manual to run controls.
5. The QA/QC should be conducted following the local regulations or the laboratory guideline.

### **Known Interference Substances**

1. The only anticoagulant recommended for the AmiShield® Veterinary Clinical Analyzer is lithium heparin. Sodium heparin must not be used when collecting blood sample for use with this rotor. The EDTA, fluoride, oxalate, and any anticoagulant containing ammonium ions will interfere with at least one chemistry in the AmiShield® Liver Plus Panel.
2. Physical interferents (hemolysis, icterus, and lipemia) may cause changes in the reported concentrations of some analytes. The sample indices are printed on the bottom of each result card to inform the operator about the levels of interferents present in each sample.
3. Bilirubin may interfere with the peroxidase used in the creatinine reaction. Creatinine results are lowered when bilirubin levels are > 10 mg/dL.
4. Glucose concentrations are affected by the length of time since the patient has eaten and by the type of sample collected from the patient. To accurately interpret glucose results, samples should be obtained from a patient that has been fasted for at least 12 hours.
5. Interference may be seen in the total protein test when analyzing samples with a lipemic index. Samples with a triglyceride concentration >400 mg/dL may show an increased total protein level.
6. Hematocrit (Hct) > 60% of whole blood samples may affect the test results.
7. Hemolysis samples will release some substrate to the serum or plasma, may cause AST, LDH, K and other biochemical markers increased significantly, ALT, UA, CHOL, ALP, CK light to moderate the degree of increase. Severe hemolysis samples recommended not to use.

### **Reference Intervals**

These normal intervals are provided only as a guideline. The most definitive reference intervals are established for your patient population. Test results should be interpreted in conjunction with the patient's clinical signs.

Analyte		Common Units		SI Units	
ALB	Canine	2.4–3.9	g/dL	24-39	g/L
	Feline	2.2–4.0	g/dL	22–40	g/L
ALP	Canine	20–212	U/L	20–212	U/L
	Feline	20–111	U/L	20-111	U/L
ALT	Canine	5–125	U/L	5–125	U/L
	Feline	5–130	U/L	5–130	U/L
AST	Canine	5–60	U/L	5–60	U/L
	Feline	5–48	U/L	5–48	U/L
BUN	Canine	6–27	mg/dL	2.14-9.64	mmol/L
	Feline	6–36	mg/dL	2.14–12.85	mmol/L
TBIL	Canine	0.1–0.9	mg/dL	1.7–15.4	µmol/L
	Feline	0.1–0.9	mg/dL	1.7–15.4	µmol/L
TP	Canine	5.1–8.0	g/dL	51–80	g/L
	Feline	5.7–8.9	g/dL	57–89	g/L
GGT	Canine	1-15	U/L	1-15	U/L
	Feline	1-15	U/L	1-15	U/L

### Dynamic range

The chemistry for each analyte is linear over the dynamic range listed below. The intervals below do not represent normal ranges.

Analyte	Common Units		SI Units	
ALB	1.0–5.0	g/dL	10.0–50.0	g/L
ALP	4–2000	U/L	4–2000	U/L
ALT	5–1500	U/L	5–1500	U/L
AST	5–1500	U/L	5–1500	U/L
BUN	2–200	mg/dL	0.71–71.4	mmol/L
TBIL	0.1–20.0	mg/dL	1.7-342	µmol/L
TP	3.0–10.0	g/dL	30.0–100.0	g/L
GGT	1-2000	U/L	1–2000	U/L

### Method Comparison

Field studies were conducted at a veterinary teaching hospital. The same serum samples were analyzed by the AmiShield® Veterinary Clinical Analyzer and a comparative method. Representative correlation statistics are shown in below.

Analyte	Correlation Coefficient	Slope	Intercept	Sample No.	Sample Range	
ALB	0.84	0.53	1.36	83	1.5-4	g/dL
ALP	0.93	1.02	11.09	81	23-3016	U/L
ALT	0.99	0.88	7.73	83	10-704	U/L
AST	0.99	0.91	4.46	83	9-259	U/L
BUN	0.97	0.89	3.34	83	8-124	mg/dL
TBIL	0.95	1.06	0.03	83	0.1-2.2	mg/dL
TP	0.93	0.92	0.47	83	3-7.9	g/dL
GGT	0.99	1.03	-0.44	83	1-74	U/L

## Bibliography

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## Symbols



Consult Instructions for use



Caution



Temperature Limitation



Reference Number



Batch code



Manufacturer



Use by



Do Not Reuse

Manufacturer : ProtectLife International Biomedical Inc.  
Address : 4F., No.8, Xinghua Rd., Taoyuan Dist., Taoyuan City 33068, Taiwan  
Customer and Technical Service : 886 3 3775599  
Official Website : [www.protectlife-intl.com](http://www.protectlife-intl.com)