Veterinary Health Check Test Panel (Thirteen Test Kits)

For professional and in vitro diagnostic use only.

1 Specification

-1 test/pouch, 10 tests/kit (Cat.no: VE60002)

2 Intended Use

The Veterinary Health Check Test Panel (Thirteen Test Kits) is used in conjunction with Chemistry Analyzer MSC100V and MS200V produced by Zhejiang PushKang Biotechnology Co., Ltd. It is intended for in vitro quantitative detection of the concentration or activity of total protein, albumin, total bilirubin, alanine aminotransferase, urea, creatinine, glucose, cholesterol, creatine kinase, amylase, alkaline phosphatase, calcium and inorganic phosphorus in anticoagulant plasma or serum.

3 Summary and Explanation

Changes in the concentration or activity of the above 13 substances in the blood are common in the hepatobiliary system, urinary system, glucose metabolism and lipid metabolism, pancreatic diseases, and cardiovascular diseases. Detecting the concentration or activity of these substances in the blood is of great significance for the auxiliary diagnosis of related diseases.

4 Applicable Instrument

Pushkang Chemistry Analyzer: MSC100V and MS200V.

5 Storage and Stability

This product should be stored at 2~8℃, stable for 12 months. The reagent discs must be used within 30 minutes after the individually sealed packaging bag is opened.

Do not store in an environment above 30℃.

The manufacturer date and the expiration date were printed on the labeling.

6 Specimen Collection and Preparation

1. For anticoagulated whole blood, plasma or serum without hemolysis, lithium heparin is recommended for anticoagulation.

2. The sample should be tested within 1 hour after collection.

3. Venous blood samples must be used.

7 Materials Required but Not Provided

- Pushkang Chemistry Analyzer

  MSC100V (Cat.no: VE20001)

  MS200V (Cat.no: VE20002)
- Sample transfer tips (type:200μL and 1mL)
- Quality control

  Normal

  Abnormal
- Diluent

8 Test Principle

This product is based on the principle of spectrophotometry to quantitatively determine the concentration or activity of 13 biochemical indicators in the sample. The reaction principle of each test item is as follows:

1. Total protein (TP), biuret method

$$\text{Protein peptide bond} + Cu^{2+} \xrightarrow{\text{Alkaline solution}} \text{Cu - protein complex}$$

In an alkaline solution, the peptide bonds of the protein combine with copper ions to form a blue-purple compound. The absorbance near the 540nm wavelength is directly proportional to the number of peptide bonds. Based on this, the protein concentration in the sample to be tested can be calculated.

2. Albumin (ALB), bromocresol green method

In a pH 4.2 solution, albumin can form a blue-green complex with bromocresol green, which has absorption peak near the wavelength of 628nm, and the absorbance is proportional to the albumin concentration.

$$\text{Albumin} + \text{Bromocresol green} \xrightarrow{\text{pH 4.2}} \text{Bromocresol green - albumin complex}$$

3. Total bilirubin (TBIL), bilirubin oxidase method

Bilirubin is oxidized under the action of bilirubin oxidase (BOD) to generate biliverdin. The absorbance of the reaction solution decreases near the bilirubin absorption peak at 453nm, and the decrease value is proportional to the bilirubin content in the sample.

$$\text{Bilirubin} + O_2 \xrightarrow{\text{BOD}} \text{Biliverdin} + H_2O$$

4. Alanine aminotransferase (ALT), rate method

ALT catalyzed L-alanine to generate pyruvic acid, which was catalyzed by lactate dehydrogenase (LDH) to generate L-lactic acid, and at the same time oxidizes NADH. NADH has absorption peak at 340nm, and the rate of absorbance decline is proportional to the activity of ALT in the sample.

$$\text{L - alanine} + \alpha\text{ - Ketoglutaric acid} \xrightarrow{\text{ALT}} \text{Pyruvic acid} + \text{L - glutamic acid}$$

$$\text{Pyruvic acid} + \text{NADH} + H^+ \xrightarrow{\text{LDH}} \text{L - lactic acid} + NAD^+$$

5. Urea , glutamate dehydrogenase method

Under the catalysis of Urease, urea is hydrolyzed to produce ammonia and carbon dioxide. In the presence of α-ketoglutarate and NADH, ammonia is catalyzed by glutamate dehydrogenase (GLDH) to produce glutamate. At the same time, NADH is oxidized, and the absorbance of the reaction solution at the NADH absorption peak at 340 nm decreases, and the rate of decrease is proportional to the

urea content in the sample.

$$Urea + 2H_2O \xrightarrow{Urease} 2NH_4^+ + CO_3^{2-}$$

$$NH_4^+ + \alpha\text{-ketoglutarate} + NADH + H^+ \xrightarrow{GLDH} Glutamate + NAD^+ + H_2O$$

6. Creatinine (CRE), creatine oxidase method

Creatinine is hydrolyzed to produce creatine under the catalysis of creatinase (CAH), creatine is hydrolyzed under the catalysis of creatinase (CRH) to produce sarcosine and urea. Sarcosine is Oxidized to glycine, formaldehyde and hydrogen peroxide under the catalysis of sarcosine oxidase (SAO). Under the action of peroxidase (POD), FDAOS is oxidized by hydrogen peroxide and coupled with 4-aminoantipyrine to develop color. The color depth is proportional to the creatinine content in the sample.

$$Creatinine + H_2O \xrightarrow{CAH} Creatine$$

$$Creatine + H_2O \xrightarrow{CRH} Sarcosine + Urea$$

$$Sarcosine + H_2O + O_2 \xrightarrow{SAO} Glycine + Formaldehyde + H_2O_2$$

$$2H_2O_2 + 4\text{-}AAP + FDAOS \xrightarrow{POD} Quinoneimine\ pigment + H_2O$$

7. Creatine kinase (CK), rate method

Creatine phosphate produces adenosine triphosphate (ATP) and creatine under the action of creatine kinase. Under the catalysis of hexokinase (HK), glucose and adenosine triphosphate (ATP) undergo a phosphorylation reaction to produce glucose-6- phosphate (G6P) and adenosine diphosphate (ADP). Glucose-6-phosphate is dehydrogenated under the catalysis of glucose-6-phosphate dehydrogenase (G-6-PD) to generate 6-phosphogluconate and at the same time reduce NADP to NADPH. NADPH has absorption peak at 340nm, and the absorbance is directly proportional to the creatine kinase activity in the sample.

$$Creatine\ phosphate \xrightarrow{CK} ATP + Creatine$$

$$Glucose + ATP \xrightarrow{HK} G6P + ADP$$

$$G6P + NADP^+ \xrightarrow{G\text{-}6\text{-}PD} 6-PG + NADPH$$

8. Glucose (GLU), hexokinase method

Catalyzed by hexokinase (HK), glucose and adenosine triphosphate (ATP) undergo a phosphorylation reaction to produce glucose-6-phosphate (G6P) and adenosine diphosphate (ADP). Glucose-6-phosphate is dehydrogenated under the catalysis of glucose-6-phosphate dehydrogenase (G-6-PD) to generate 6-phosphogluconate and at the same time reduce NADP to NADPH. NADPH has absorption peak at 340nm, and the absorbance is directly proportional to the glucose concentration in the sample.

$$Glucose + ATP \xrightarrow{HK} G6P + ADP$$

$$G6P + NADP \xrightarrow{G\text{-}6\text{-}PD} 6-PG + NADPH + H^+$$

9. Cholesterol (CHOL), enzymatic method

Cholesterol ester (CE) is hydrolyzed by cholesteryl ester hydrolase(CEH) to free cholesterol, which is oxidized by cholesterol oxidase (COD) to cholestenone, and produce hydrogen peroxide. Under the action of peroxidase (POD), hydrogen peroxide, 4-aminoantipyrine (4-AAP) and phenol produce red quinoneimine pigment, and the absorbance is proportional to the total cholesterol content in the sample.

$$CE + H_2O \xrightarrow{CEH} Cholesterol + Fatty\ acid$$

$$Cholesterol + O_2 \xrightarrow{COD} Cholestenone + H_2O_2$$

$$2H_2O_2 + 4-AAP + Phenol \xrightarrow{POD} Benzoquinone\ imine + 4H_2O$$

10. Amylase (AMY), rate method

Amylase catalyzes the decomposition of ethylene-p-nitrophenol-maltoheptanoside to produce smaller oligoglycosides. The latter continues to be decomposed into glucose under the catalysis of α-glucosidase (AGLU) and releases p-nitrophenol. P-Nitrophenol has an absorption peak at 405nm. Monitoring the rate of increase in absorbance can determine the amylase activity in the sample.

$$5E\text{-}4\text{-}NP\text{-}G_7 + 5H_2O \xrightarrow{AMY} 2E\text{-}G_5 + 2G_2\text{-}4\text{-}NP + 2E\text{-}G_4 + 2G_3\text{-}4\text{-}NP + E\text{-}G_3 + G_4\text{-}4\text{-}NP$$

$$2G_2\text{-}4\text{-}NP + 2G_3\text{-}4\text{-}NP + G_4\text{-}4\text{-}NP + 14H_2O \xrightarrow{AGLU} 5(4\text{-}NP) + 14G$$

11. Alkaline Phosphatase (ALP), rate method

P-nitrobenzene phosphate (4-NNP) is colorless in alkaline solutions. Under ALP catalysis, 4-NNP is split to phosphate acyl to form free p-nitrophenol (4-NP). The latter is transformed into a quinone structure in alkaline solution, presenting a darker yellow color. ALP activity can be calculated by monitoring the rate of absorbance change at 405nm.

$$4\text{-}NNP \xrightarrow{ALP} Phosphate\ acyl + 4\text{-}NP$$

12. Calcium (Ca^{2+}), Arsenazo III method

Calcium ions combine with arsenazo III to form a purple-red chelate, and its color is directly proportional to the calcium ion content in the sample.

$$Ca^{2+} + Arsenazo\ III \longrightarrow Ca\text{-}Arsenazo\ III$$

13. Inorganic phosphorus (P), enzymatic method

Inorganic phosphorus (phosphate) reacts with inosine to form hypoxanthine under the action of purine nucleoside phosphorylase (PNP). Hypoxanthine is catalyzed by xanthine oxidase (XOD) to produce uric acid and hydrogen peroxide. Under the catalysis of peroxidase (POD), hydrogen peroxide reacts with chromogen substances, and the color is directly proportional to the concentration of inorganic phosphorus.

$$Inorganic\ phosphorus + Inosine \xrightarrow{PNP} Hypoxanthine + Ribose\ phosphate$$

$$Hypoxanthine + 2O_2 + 2H_2O \xrightarrow{XOD} Uric\ acid + 2H_2O_2$$

$$2H_2O_2 + 4\text{-}Aminoantipyrine + Chromogen \xrightarrow{POD} Quinone\ pigments + 4H_2O$$

9 Test Procedure

- **Reagent preparation**
  The reagent panel is lyophilized reagent, for MSC100V the diluent should be manually added before use.

  For MS200V the diluent could be added automatically during the use.
- **Test condition**

The information about the reagent panel can be obtained by scanning the QR code on the package of the reagent panel.

- **Operation step**

1. The instrument scans the QR code on the reagent panel to read the reagent information.
2. Take the reagent panel out of the sealed bag and place it horizontally. Add 140μL of the sample to be tested (serum, plasma or whole blood) into the sample hole and 750μL of diluent into the diluent hole.
3. Place the reagent panel in the middle of the reagent panel tray of the chemistry analyzer.
4. Operate in accordance with the operating instructions of the instrument. The instrument automatically distributes the sample and diluent in the reagent panel to each reaction well, the lyophilized reagent is dissolved, the reaction starts, and the instrument automatically reads the test result.

Note:

1.The QR code contains the information required for the test, and each batch of products is different. It must be used with the reagent panel of the same batch number, and cannot be mixed, otherwise you will get wrong test results.

2.If the product's individual package has been damaged before use, or the reagent panel is found to be broken after opening the sealed pouch, it cannot be used for testing, otherwise it may cause abnormal testing process and even damage the instrument. When the reagent panel falls from a high place, it should not be used for testing, regardless of whether or not the panel produces visible broken, in order to avoid more serious accidents.

3. Foreign objects and stains on the surface of the reagent panel may affect the accuracy of the test results. Be especially careful during operation to avoid touching the upper and lower surfaces of the reagent panel. It is recommended to wear powder-free gloves for operation.、

4. When adding samples, the tip of the suction head should be inserted into the corresponding liquid filling hole, and then press the pipettor button to ensure that the liquid completely enters the inside of the panel. If liquid sprinkled on the surface of the panel, wipe it with absorbent paper carefully before testing on the machine.

5. The reagent panel should be tested immediately after adding the sample and diluent. Before the reagent panel after sample adding is tested on the machine, excessive tilt and deliberate shaking should be avoided.

6. If the sample and diluent are added in a volume that does not meet the required volume, it may cause an abnormality in the inspection process.

7. In order to avoid cross-contamination, the same suction head should not be reused for absorbing multiple samples, nor can it be mixed for absorbing samples and diluents.

8. You should prepare your own diluent to use this reagent disc. The diluent is purified water. The diluent should avoid prolonged exposure to the air to prevent contamination. It is recommended to use a single package of sterilized water for injection with a smaller dose, ready to use.

- **Test result calculation**

The built-in calculation function of the instrument can automatically calculate the test results of each item according to the change value of absorbance, and display and/or print them.

- **Calibration procedure**

1. The Chemistry analyzer is calibrated by manufacturer before shipment. There is a QR code on each reagent disc, which contains calibration information. The user scans the QR code, and the instrument automatically reads the calibration curve information.
2. When changing the batch number of the kit, you should scan the QR code again to read the calibration information. Each laboratory can formulate its own calibration cycle according to the specific situation.
3. When the following situations occur, it is recommended to rescan the calibration information: the batch number of the kit has changed, the quality control value has a remarkable deviation, and the instrument has undergone major maintenance.

- **Quality control procedure**

1. Quality control must be performed when the batch number of the kit is changed and the instrument undergoes major maintenance.
2. The control can use Randox's composite chemistry control serum.
3. Each laboratory can set appropriate control limits and quality control cycles according to their own conditions. The quality control value must be within the specified control limits.

If the quality control results are not in line with expectations, it indicates that the test results are unreliable, and a test report should not be issued.

10 Reference Interval

Item	Unit	Group	Reference interval
TP	g/L	Dog	Infancy: 48~72; Adult: 52~82
		Cat	Infancy: 55~87; Adult: 60~94
		Rabbit	55~72
		Rat	36~66
		Swine	60~80
		Monkey	59~76
		Lizard	30~81
		Horse	Infancy: 47~72; Adult: 56~79
		Bovine	60~75
		Sheep	56~78
		Tortoise	30~70
ALB	g/L	Dog	Infancy: 21~36; Adult: 23~40
		Cat	Infancy: 18~35;

			Adult: 18~36
		Rabbit	22~37
		Rat	25~48
		Swine	18~33
		Monkey	28~44
		Lizard	/
		Horse	Infancy: 30~40; Adult: 19~32
		Bovine	25~43
		Sheep	24~37
		Tortoise	13~30
TBIL	umol/L	Dog	Infancy: 0~14; Adult: 0~15
		Cat	0~15
		Rabbit	5~14
		Rat	2~15
		Swine	2~5
		Monkey	2~10
		Lizard	/
		Horse	Infancy: 0~69; Adult: 0~60
		Bovine	0~27
		Sheep	2~7
		Tortoise	2~10
ALT	U/L	Dog	Infancy: 46~337; Adult: 23~212
		Cat	Infancy: 20~192; Adult: 20~111
		Rabbit	70~145
		Rat	62~209
		Swine	92~249
		Monkey	73~210
		Lizard	60~99
		Horse	Infancy: 505~4667; Adult: 0~326
		Bovine	18~153
		Sheep	50~228
		Tortoise	36~156
Urea	mmol/L	Dog	Infancy: 2.5~10.4; Adult: 2.5~9.6
		Cat	Infancy: 4~11.8; Adult: 4~12.9
		Rabbit	3.6~8.6
		Rat	6.4~10.4
		Swine	2.1~10.7
		Monkey	2.5~8.9
		Lizard	0.4~4.3
		Horse	Infancy: 2~9.6; Adult: 3.6~8.9
		Bovine	3.6~8.9
		Sheep	1.8~7.1
		Tortoise	6.8~11.8
CRE	umol/L	Dog	Infancy: 27~106; Adult: 44~159
		Cat	Infancy: 53~141; Adult: 71~212
		Rabbit	71~159
		Rat	18~71
		Swine	44~186
		Monkey	35~106
		Lizard	0~13
		Horse	Infancy: 75~150; Adult: 71~194
		Bovine	44~194
		Sheep	53~133
		Tortoise	10~35
CK	U/L	Dog	Infancy: 99~436; Adult: 10~200
		Cat	Infancy: 0~394; Adult: 0~314
		Rabbit	218~2705
		Rat	68~1070
		Swine	50~3531
		Monkey	63~460
		Lizard	/
		Horse	Infancy: 21~473; Adult: 10~350
		Bovine	0~350
		Sheep	10~100
		Tortoise	/
GLU	mmol/L	Dog	Infancy: 4.28~8.33; Adult: 4.11~7.94
		Cat	Infancy: 4.28~8.5; Adult: 4.11~8.83
		Rabbit	4.17~8.06
		Rat	5~10.67
		Swine	4.72~8.89
		Monkey	2.78~5.56
		Lizard	3~11
		Horse	Infancy: 6.05~14.88; Adult: 3.56~8.33
		Bovine	2~5.6
		Sheep	2.78~4.44
		Tortoise	/
CHOL	mmol/L	Dog	Infancy: 2.58~10.34; Adult: 2.84~8.27
		Cat	Infancy: 1.6~4.94; Adult: 1.68~5.81
		Rabbit	0.9~1.37
		Rat	0.93~2.48
		Swine	0.47~2.04
		Monkey	1.89~4.63
		Lizard	1.19~3.62
		Horse	Infancy: 2.02~11.83; Adult: 1.29~2.84
		Bovine	1.6~5
		Sheep	1.14~2.12
		Tortoise	/
AMY	U/L	Dog	Infancy: 300~1560; Adult: 400~1500
		Cat	500~1500
		Rabbit	200~378
		Rat	1691~3615
		Swine	271~1198
		Monkey	149~500
		Lizard	/
		Horse	0~35
		Bovine	41~98

		Sheep	0~30
		Tortoise	/
ALP	U/L	Dog	Infancy: 46~337; Adult: 23~212
		Cat	Infancy: 20~192; Adult: 20~111
		Rabbit	70~145
		Rat	62~209
		Swine	92~294
		Monkey	73~210
		Lizard	60~99
		Horse	Infancy: 505~4667; Adult: 0~326
		Bovine	18~153
		Sheep	50~228
		Tortoise	36~156
Ca^{2+}	mmol/L	Dog	Infancy: 1.95~3.15; Adult: 1.98~3
		Cat	Infancy: 1.98~2.83; Adult: 1.95~2.83
		Rabbit	1.4~3
		Rat	1.48~2.35
		Swine	1.63~2.85
		Monkey	2.08~2.53
		Lizard	1.9~2.5
		Horse	Infancy: 2.34~2.96; Adult: 2.6~3.23
		Bovine	2~2.85
		Sheep	2.28~2.7
		Tortoise	2.5~3.63
P	mmol/L	Dog	Infancy: 1.65~3.35; Adult: 0.81~2.19
		Cat	Infancy: 1.45~3.35; Adult: 1~2.42
		Rabbit	0.39~1.58
		Rat	1.97~3.26
		Swine	1.16~2.97
		Monkey	0.77~2.1
		Lizard	0.61~1.65
		Horse	Infancy: 1.29~2.29; Adult: 0.58~1.81
		Bovine	1.8~3.3
		Sheep	1.29~2.87
		Tortoise	0.74~3.71

11 Warnings and Precautions

1. For in vitro diagnosis of animal diseases use only.
2. The reagent discs is a disposable consumable. Do not reuse.
3. The reagent panel that have completed the test may contain pathogenic pathogens and are infectious, and must be disposed of in accordance with the laws and regulations of the place where the test is located.

12 Index of Symbols

	Store between 2-8℃
	Consult instructions for use
	Batch code
	Use-by date
	Contains sufficient for <n> tests
	Do not use if package is damaged
	Do not reuse
	Keep away from sunlight
	Caution

13 Basic Information

Manufacturer: Zhejiang PushKang Biotechnology Co., Ltd.

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