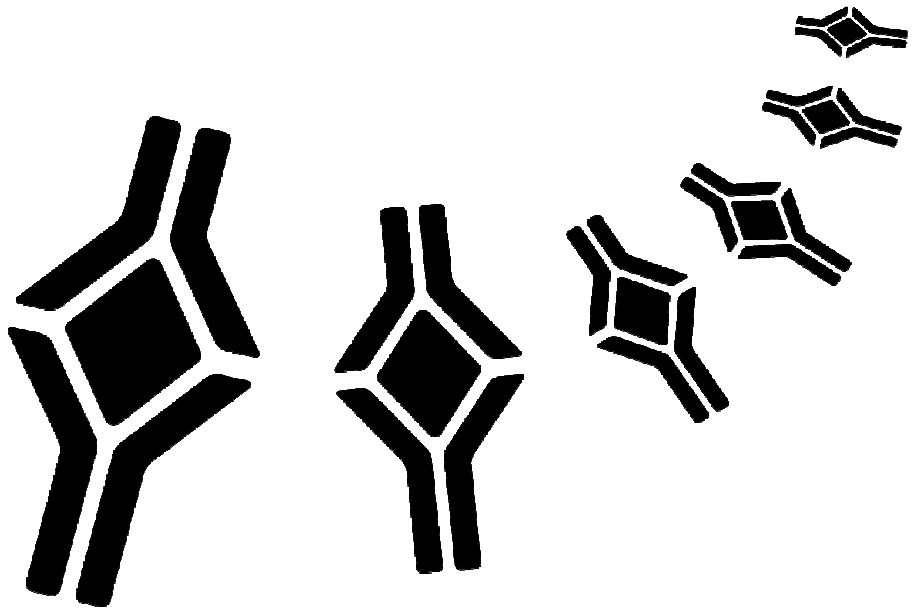
BioVendor
Research
and Diagnostic Products



HUMAN SURFACTANT PROTEIN A ELISA

Product Data Sheet

Cat. No.: RD191139200R

For Research Use Only

VERSION 06 210411 44

CONTENTS

» **This kit is manufactured by:**
BioVendor – Laboratorní medicína a.s.

» **Use only the current version of Product Data Sheet enclosed with the kit!**

1. INTENDED USE

The RD191139200R Human Surfactant Protein A ELISA is a sandwich enzyme immunoassay for the quantitative measurement of human surfactant protein A.

Features

- **It is intended for research use only**
- The total assay time is less than 4 hours
- The kit measures total surfactant protein A in serum, plasma (citrate, heparin), bronchoalveolar lavage fluid and amniotic fluid
- Assay format is 96 wells
- Quality Controls are human serum based. No animal sera are used
- Standard is native protein based
- Components of the kit are provided ready to use, concentrated or lyophilized

2. STORAGE, EXPIRATION

Store the complete kit at 2-8°C. Under these conditions, the kit is stable until the expiration date (see label on the box).

For stability of opened reagents see Chapter 9.

3. INTRODUCTION

Surfactant protein A (SP-A; surfactant- associated protein A – SFTPA; pulmonary surfactant-associated protein A – PSPA) is the major protein component of the lung surfactant in mammals. It belongs, together with SP-D, to the collectins' family, due to its C-type lectin domain and the collagen-like N-terminal triple helix. The lectin domain mediates the interaction between a collectin and a wide variety of pathogens. The oligomeric structure of SP-A comprises two types of polypeptide chains: SP-A1 and SP-A2 transcribed from sftpa1 and sftpa2 genes. Six trimers of SP-A form its complete octadecameric structure.
Human SP-A is expressed primarily in the lung, mostly in alveolar type II cells and also in non-ciliated bronchial epithelial cells. SP-A mRNA can be detected in fetal lung cells after only 20 weeks of gestation. SP-A has been found in various biological fluids, such as bronchoalveolar lavage fluid, sputum, serum, amniotic fluid and vaginal lavage fluid. It has also been found to be expressed in cells of the small and large intestine.
SP-A is considered to be an important component of host defence against respiratory allergens and pathogens. SP-A partakes in modulating the function of immune system cells – especially dendritic cells and T-cells. Many studies have shown that inflammatory mediators (e.g. TNF) are controlled by SP-A, both positively and negatively.
Changes in SP-A production in the lung or its baseline concentrations in serum might be associated with progression or mortality at idiopatic pulmonary fibrosis (IPF). Reduced levels of SP-A in alveolar fluid were also reported in other pulmonary diseases, e.g. acute respiratory distress syndrome (ARDS). Furthermore, elevated levels of SP-A in lungs have been observed in pulmonary alveolar proteinosis (PAP).

Areas of investigation:
Immune response, infection and inflammation
Pulmonary disease

4. TEST PRINCIPLE

In the BioVendor Human Surfactant Protein A (SP-A) ELISA, standards, quality controls and samples are incubated in microplate wells pre-coated with monoclonal anti-human SP-A antibody. After 2 hours incubation at 37°C and washing, biotin labelled polyclonal anti-human SP-A antibody is added to the wells and incubated for 60 minutes with captured surfactant protein A. After another washing, streptavidin-HRP conjugate is added. After 30 minutes incubation and the last washing step, the remaining conjugate is allowed to react with the substrate solution (TMB). The reaction is stopped by addition of acidic solution and absorbance of the resulting yellow product is measured. The absorbance is proportional to the concentration of SP-A. A standard curve is constructed by plotting absorbance values against concentrations of standards, and concentrations of unknown samples are determined using this standard curve.

5. PRECAUTIONS

- **For professional use only**
- Wear gloves and laboratory coats when handling immunodiagnostic materials
- Do not drink, eat or smoke in the areas where immunodiagnostic materials are being handled
- This kit contains components of human origin. These materials were found non-reactive for HBsAg, HCV antibody and for HIV 1/2 antigen and antibody. However, these materials should be handled as potentially infectious, as no test can guarantee the complete absence of infectious agents
- Avoid contact with the acidic Stop Solution and Substrate Solution, which contains hydrogen peroxide and tetramethylbenzidine (TMB). Wear gloves and eye and clothing protection when handling these reagents. Stop and/or Substrate Solutions may cause skin/eyes irritation. In case of contact with the Stop Solution and the Substrate Solution wash skin/eyes thoroughly with water and seek medical attention, when necessary
- The materials must not be pipetted by mouth

6. TECHNICAL HINTS

- Reagents with different lot numbers should not be mixed
- Use thoroughly clean glassware
- Use deionized (distilled) water, stored in clean containers
- Avoid any contamination among samples and reagents. For this purpose, disposable tips should be used for each sample and reagent
- Substrate Solution should remain colourless until added to the plate. Keep Substrate Solution protected from light
- Stop Solution should remain colourless until added to the plate. The colour developed in the wells will turn from blue to yellow immediately after the addition of the Stop Solution. Wells that are green in colour indicate that the Stop Solution has not mixed thoroughly with the Substrate Solution
- Dispose of consumable materials and unused contents in accordance with applicable national regulatory requirements

7. REAGENTS SUPPLIED

Kit Components	*State*	*Quantity*
Antibody Coated Microtiter Strips	ready to use	96 wells
Biotin Labelled Antibody Conc. (100x)	concentrated	0.15 ml
Streptavidin-HRP Conjugate	ready to use	13 ml
Master Standard	lyophilized	1 vial
Quality Control HIGH	lyophilized	1 vial
Quality Control LOW	lyophilized	1 vial
Dilution Buffer	ready to use	50 ml
Biotin-Ab Diluent	ready to use	13 ml
Wash Solution Conc. (10x)	concentrated	100 ml
Substrate Solution	ready to use	13 ml
Stop Solution	ready to use	13 ml
Product Data Sheet + Certificate of Analysis	-	1 pc

8. MATERIAL REQUIRED BUT NOT SUPPLIED

- Deionized (distilled) water
- Test tubes for diluting samples
- Glassware (graduated cylinder and bottle) for Wash Solution (Dilution Buffer)
- Precision pipettes to deliver 10-1000 µl with disposable tips
- Multichannel pipette to deliver 100 µl with disposable tips
- Absorbent material (e.g. paper towels) for blotting the microtitrate plate after washing
- Vortex mixer
- Thermostatic box adjustable to 37°C
- Orbital microplate shaker capable of approximately 300 rpm
- Microplate washer (optional) [Manual washing is possible but not preferable]
- Microplate reader with 450 ± 10 nm filter, preferably with reference wavelength 630 nm (alternatively another one from the interval 550 - 650 nm)
- Software package facilitating data generation and analysis (optional)

9. PREPARATION OF REAGENTS

» **All reagents need to be brought to room temperature prior to use**

» **Always prepare only the appropriate quantity of reagents for your test**

» **Do not use components after the expiration date marked on their label**

- **Assay reagents supplied ready to use:**

Antibody Coated Microtiter Strips
Stability and storage:
Return the unused strips to the provided aluminium zip-sealed bag with desiccant and seal carefully. Remaining Microtiter Strips are stable 3 months when stored at 2-8°C and protected from the moisture.

Dilution Buffer
Biotin-Ab Diluent
Streptavidin-HRP Conjugate
Substrate Solution
Stop Solution
Stability and storage:
Opened reagents are stable 3 months when stored at 2-8°C.

- **Assay reagents supplied concentrated or lyophilized:**

Master Standard
Refer to the Certificate of Analysis for current volume of Dilution Buffer needed for reconstitution of standard!!!
Reconstitute the lyophilized Master Standard with Dilution Buffer just prior to the assay. Let it dissolve at least 15 minutes with occasional gentle shaking (not to foam). The resulting concentration of the human SP-A in the stock solution is **100 ng/ml**.

Prepare set of standards using Dilution Buffer as follows:

Volume of Standard	*Dilution Buffer*	*Concentration*
Stock	-	100 ng/ml
300 µl of stock	300 µl	50 ng/ml
300 µl of 50 ng/ml	300 µl	25 ng/ml
300 µl of 25 ng/ml	450 µl	10 ng/ml
300 µl of 10 ng/ml	300 µl	5 ng/ml
300 µl of 5 ng/ml	450 µl	2 ng/ml
300 µl of 2 ng/ml	300 µl	1 ng/ml

Prepared Standards are ready to use, do not dilute them.

Stability and storage:

Standard stock solution (100 ng/ml) should be aliquoted and frozen at –20°C for 3 months. Avoid repeated freeze/thaw cycles.

Do not store the diluted Standard solutions.

Quality Controls HIGH, LOW

Refer to the Certificate of Analysis for current volume of Dilution Buffer needed for reconstitution and for current Quality Control concentration!!!

Reconstitute each Quality Control (HIGH and LOW) with Dilution Buffer just prior to the assay. Let it dissolve at least 15 minutes with occasional gentle shaking (not to foam).

Reconstituted Quality Controls are ready to use, do not dilute them.

Stability and storage:

The reconstituted Quality Controls must be used immediately or aliquoted and frozen at -20°C for 3 months. Avoid repeated freeze/thaw cycles.

Biotin Labelled Antibody Conc. (100x)

Prepare the working Biotin Labelled Antibody solution by adding 1 part of Biotin Labelled Antibody Concentrate (100x) to 99 parts Biotin-Ab Diluent.

Example: 10 µl of Biotin Labelled Antibody Concentrate (100x) + 990 µl of Biotin-Ab Diluent, for 1 strip (8 wells).

Stability and storage:

Opened Biotin Labelled Antibody Concentrate (100x) is stable 3 months when stored at 2-8°C

Do not store diluted Biotin Labelled Antibody working solution.

Wash Solution Conc. (10x)

Dilute Wash Solution Concentrate (10x) ten-fold in distilled water to prepare a 1x working solution. Example: 100 ml of Wash Solution Concentrate (10x) + 900 ml of distilled water for use of all 96-wells.

Stability and storage:

The diluted Wash Solution is stable 1 month when stored at 2-8°C. Opened Wash Solution Concentrate (10x) is stable 3 months when stored at 2-8°C.

10. PREPARATION OF SAMPLES

The kit measures SP-A in serum, plasma (citrate, heparin), bronchoalveolar lavage fluid and amniotic fluid.

Samples should be assayed immediately after collection or should be stored at -20°C. Mix thawed samples thoroughly just prior to the assay and avoid repeated freeze/thaw cycles, which may cause erroneous results. Avoid using hemolyzed or lipemic samples.

Dilute serum or plasma samples 10x with Dilution Buffer just prior to the assay (e.g. 15 µl of sample + 135 µl of Dilution Buffer for singlets, or preferably 25 µl of sample + 225 µl of Dilution Buffer for duplicates). **Mix well** (not to foam). Vortex is recommended.

In case of measurement of surfactant protein A in bronchoalveolar lavage fluid (BALF) samples or amniotic fluid (AF) samples, an appropriate dilution should be assessed by the researcher in advance to batch measurement. Recommended starting dilution is 100x for BALF samples, e.g. 5 µl of BALF sample + 495 µl of Dilution Buffer and 50x for AF samples, e.g. 10 µl of AF sample + 490 µl of Dilution Buffer.

Stability and storage:
Samples should be stored at -20°C, or preferably at -70°C for long-term storage. Avoid repeated freeze/ thaw cycles.
Do not store the diluted samples.

See Chapter 13 for stability of serum and plasma samples when stored at 2-8°C, effect of freezing/thawing and effect of sample matrix (serum/plasma) on the concentration of SP-A.

Note: It is recommended to use a precision pipette and a careful technique to perform the dilution in order to get precise results.

Ask for protocol at info@biovendor.com if assaying tissue culture medium, bronchoalveolar lavage fluid or amniotic fluid.

11. ASSAY PROCEDURE

1. Pipet **100 µl** of diluted Standards, Quality Controls, Dilution Buffer (=Blank) and samples, preferably in duplicates, into the appropriate wells. See *Figure 1* for example of work sheet.
2. Incubate the plate at **37°C** for **2 hour** without shaking.
3. Wash the wells 3-times with Wash Solution (0.35 ml per well). After final wash, invert and tap the plate strongly against paper towel.
4. Add **100 µl** of Biotin Labelled Antibody solution into each well.
5. Incubate the plate at room temperature (ca. 25°C) for **1 hour**, shaking at ca. 300 rpm on an orbital microplate shaker.
6. Wash the wells 3-times with Wash Solution (0.35 ml per well). After final wash, invert and tap the plate strongly against paper towel.
7. Add **100 µl** of Streptavidin-HRP Conjugate into each well.
8. Incubate the plate at room temperature (ca. 25°C) for **30 min**, shaking at ca. 300 rpm on an orbital microplate shaker.
9. Wash the wells 3-times with Wash Solution (0.35 ml per well). After final wash, invert and tap the plate strongly against paper towel.
10. Add **100 µl** of Substrate Solution into each well. Avoid exposing the microtiter plate to direct sunlight. Covering the plate with e.g. aluminium foil is recommended.
11. Incubate the plate for **10 minutes** at room temperature. The incubation time may be extended [up to 20 minutes] if the reaction temperature is below than 20°C. Do not shake the plate during the incubation.
12. Stop the colour development by adding **100 µl** of Stop Solution.
13. Determine the absorbance of each well using a microplate reader set to 450 nm, preferably with the reference wavelength set to 630 nm (acceptable range: 550 - 650 nm). Subtract readings at 630 nm (550 - 650 nm) from the readings at 450 nm. **The absorbance should be read within 5 minutes following step 12.**

Note 1: If some samples and standard/s have absorbances above the upper limit of your microplate reader, perform a second reading at 405 nm. A new standard curve, constructed using the values measured at 405 nm, is used to determine SP-A concentration of off-scale standards and samples. The readings at 405 nm should not replace the readings for samples that were "in range" at 450 nm.

Note 2: Manual washing 3-times: Aspirate wells and pipet 0.35 ml Wash Solution into each well. Aspirate wells and repeat twice. After final wash, invert and tap the plate strongly against paper towel. Make certain that Wash Solution has been removed entirely.

	strip 1+2	strip 3+4	strip 5+6	strip 7+8	strip 9+10	strip 11+12
A	**Standard 50**	**QC HIGH**	Sample 8	Sample 16	Sample 24	Sample 32
B	**Standard 25**	Sample 1	Sample 9	Sample 17	Sample 25	Sample 33
C	**Standard 10**	Sample 2	Sample 10	Sample 18	Sample 26	Sample 34
D	**Standard 5**	Sample 3	Sample 11	Sample 19	Sample 27	Sample 35
E	**Standard 2**	Sample 4	Sample 12	Sample 20	Sample 28	Sample 36
F	**Standard 1**	Sample 5	Sample 13	Sample 21	Sample 29	Sample 37
G	**Blank**	Sample 6	Sample 14	Sample 22	Sample 30	Sample 38
H	**QC LOW**	Sample 7	Sample 15	Sample 23	Sample 31	Sample 39

Figure 1: Example of a work sheet.

12. CALCULATIONS

Most microplate readers perform automatic calculations of analyte concentration. The standard curve is constructed by plotting the mean absorbance (Y) of Standards against the known concentration (X) of Standards in logarithmic scale, using the four-parameter algorithm. Results are reported as concentration of SP-A ng/ml in samples.

Alternatively, the logit log function can be used to linearize the standard curve, i.e. logit of the mean absorbance (Y) is plotted against log of the known concentration (X) of Standards.

The measured concentration of samples and Quality Controls calculated from the standard curve must be multiplied by their respective dilution factor because samples and Quality Controls have been diluted prior to the assay (e.g. 13.5 ng/ml (from standard curve) x 10 (dilution factor) = 135 ng/ml). [Quality Control samples used in this ELISA are reconstituted in volume that corresponds to dilution 10x.]

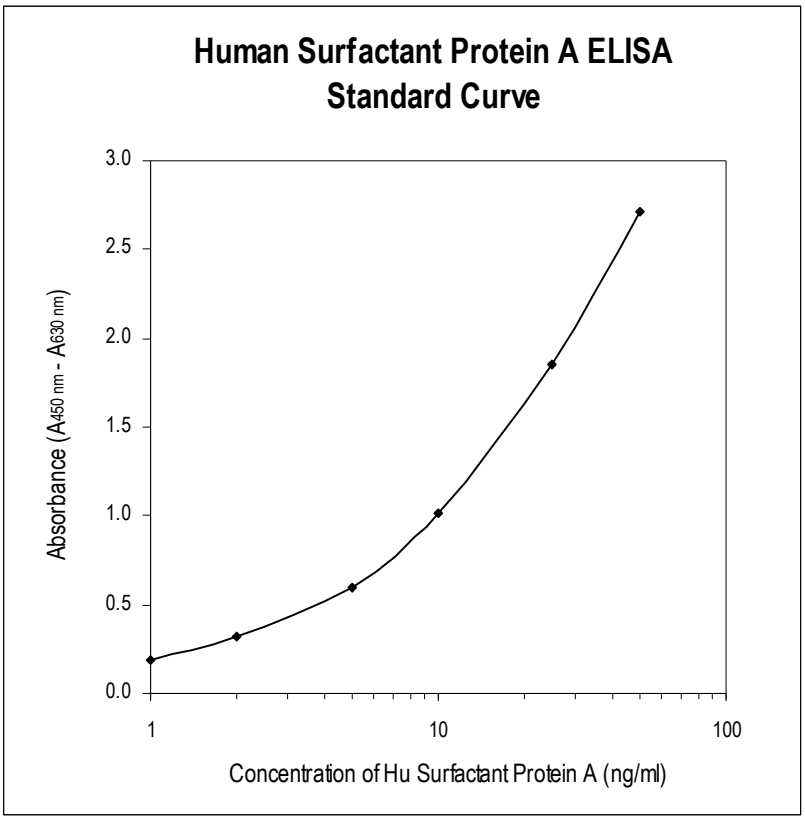


Figure 2: Typical Standard curve for Human SP-A ELISA.

13. PERFORMANCE CHARACTERISTICS

» Typical analytical data of BioVendor Human SP-A ELISA are presented in this chapter

- **Sensitivity**

Limit of Detection (LOD) (defined as concentration of analyte giving absorbance higher than mean absorbance of blank* plus three standard deviations of the absorbance of blank: A_{blank} + $3xSD_{blank}$) is calculated from the real SP-A values in wells and is 0.16 ng/ml.
*Dilution Buffer is pipetted into blank wells.

- **Limit of assay**

Results exceeding SP-A level of 500 ng/ml (at dilution 10-times) should be repeated with more diluted samples. Corresponding dilution factor needs to be taken into consideration in calculating the SP-A concentration.

- **Specificity**

Antibodies used in this ELISA are specific for human surfactant protein A with no detectable crossreactivities to the following proteins: surfactant protein D, Clara cell protein at 100 ng/ml.
Sera of several mammalian species were measured in the assay. See results below.
For details please contact us at info@biovendor.com.

Mammalian serum sample	*Observed crossreactivity*
Bovine	no
Cat	no
Dog	no
Goat	no
Hamster	no
Horse	no
Monkey	no
Mouse	no
Pig	no
Rabbit	no
Rat	no
Sheep	no

» **Presented results are multiplied by respective dilution factor**

- **Precision**

Intra-assay (Within-Run) (n=8)

Sample	*Mean (ng/ml)*	*SD (ng/ml)*	*CV (%)*
1	17.51	0.58	3.31
2	40.74	1.71	4.68

Inter-assay (Run-to-Run) (n=6)

Sample	*Mean (ng/ml)*	*SD (ng/ml)*	*CV (%)*
1	17.98	1.83	10.2
2	37.66	3.30	8.8

- **Spiking Recovery**

Serum samples were spiked with different amounts of human SP-A and assayed.

Sample	***O**bserved (ng/ml)*	***E**xpected (ng/ml)*	*Recovery **O/E** (%)*
1	12.7	-	-
	70.6	62.7	112.6
	103.5	112.7	91.8
	221.5	212.7	104.1
2	30.8	-	-
	76.6	80.8	94.8
	118.4	130.8	90.5
	223.3	230.8	96.8

- **Linearity**

Serum samples were serially diluted with Dilution Buffer and assayed.

Sample	*Dilution*	***O**bserved (ng/ml)*	***E**xpected (ng/ml)*	*Recovery **O/E** (%)*
1	-	18.80	-	-
	2x	9.37	9.40	99.7
	4x	4.65	4.70	98.9
2	-	34.96	-	-
	2x	19.29	17.48	110.4
	4x	8.65	8.74	99.0

- **Effect of sample matrix**

Citrate, heparin and EDTA plasma samples were compared to respective serum samples from the same 10 individuals.
Results are shown below:

Volunteer No.	*Serum (ng/ml)*	*Plasma (ng/ml)*		
		EDTA	*Citrate*	*Heparin*
1	19.41	3.10	13.31	17.58
2	24.97	3.82	17.93	22.50
3	17.75	4.25	11.07	14.27
4	24.98	3.61	17.73	19.54
5	31.70	3.29	20.83	23.52
6	23.78	4.10	16.09	17.51
7	18.01	3.21	11.70	14.19
8	36.70	3.21	23.63	27.28
9	26.35	3.48	15.24	18.17
10	14.90	3.50	9.66	12.29
Mean (ng/ml)	23.85	3.56	15.72	18.68
Mean Plasma/Serum (%)	-	14.9	65.9	78.3
Coefficient of determination R^2	-	0.07	0.95	0.90

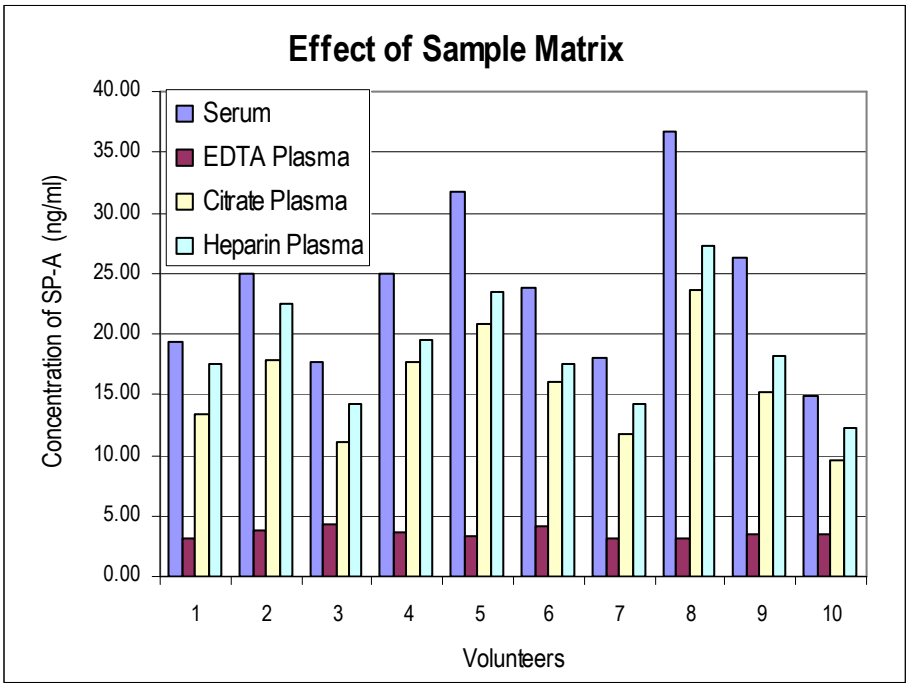


Figure 3: SP-A levels measured using Human SP-A ELISA in 10 individuals using serum, EDTA, citrate and heparin plasma, respectively.

- **Stability of samples stored at 2-8°C**

Samples should be stored at –20°C. However, no decline in concentration of SP-A was observed in serum and plasma samples after 7 days when stored at 2-8°C. To avoid microbial contamination, samples were treated with ε-aminocaproic acid and sodium azide, resulting in the final concentration of 0.03% and 0.1%, respectively.

Sample	*Incubation Temp, Period*	*Serum (ng/ml)*	*Plasma (ng/ml)*	
			Citrate	*Heparin*
1	-20°C	22.31	19.50	25.37
	2-8°C, 1 day	23.55	18.84	22.89
	2-8°C, 7 days	24.38	19.74	22.31
2	-20°C	63.89	52.60	61.62
	2-8°C, 1 day	62.47	50.80	60.49
	2-8°C, 7 days	64.08	55.23	65.40

- **Effect of Freezing/Thawing**

No decline was observed in concentration of human SP-A in serum and plasma samples after repeated (5x) freeze/thaw cycles. However it is recommended to avoid unnecessary repeated freezing/thawing of the samples.

Sample	*Number of f/t cycles*	*Serum (ng/ml)*	*Plasma (ng/ml)*	
			Citrate	*Heparin*
1	1x	24.99	14.87	17.32
	3x	19.99	14.84	25.09
	5x	25.29	18.10	20.14
2	1x	32.20	25.69	38.27
	3x	33.81	24.18	25.89
	5x	31.06	24.18	27.47
3	1x	87.22	71.55	81.70
	3x	87.22	70.09	89.04
	5x	92.51	70.95	82.65

- **Reference range**

The reference range of serum samples from healthy volunteers (N=40) has been determined using this Human SP-A ELISA kit in our laboratory:
Normal range comprised SP-A concentration values 13 - 65 ng/ml (median 33 ng/ml).
The data quoted in these instructions should be used for guidance only. It is recommended that each laboratory include its own panel of control samples in the assay. Each laboratory should establish its own normal and pathological reference ranges for human SP-A levels with the assay.

14. DEFINITION OF THE STANDARD

The Standard used in this kit is a purified native human surfactant protein A. The native human SP-A is reported to be an octadecamer composed of two distinct monomer subtypes (SP-A1 and SP-A2) - 35 kDa glycosylated polypeptides, each consisting of 248 amino acid moieties.

15. METHOD COMPARISON

The BioVendor Human SP-A ELISA has been compared to another commercial immunoassay by measuring 51 serum samples. The following correlation graph has been obtained:

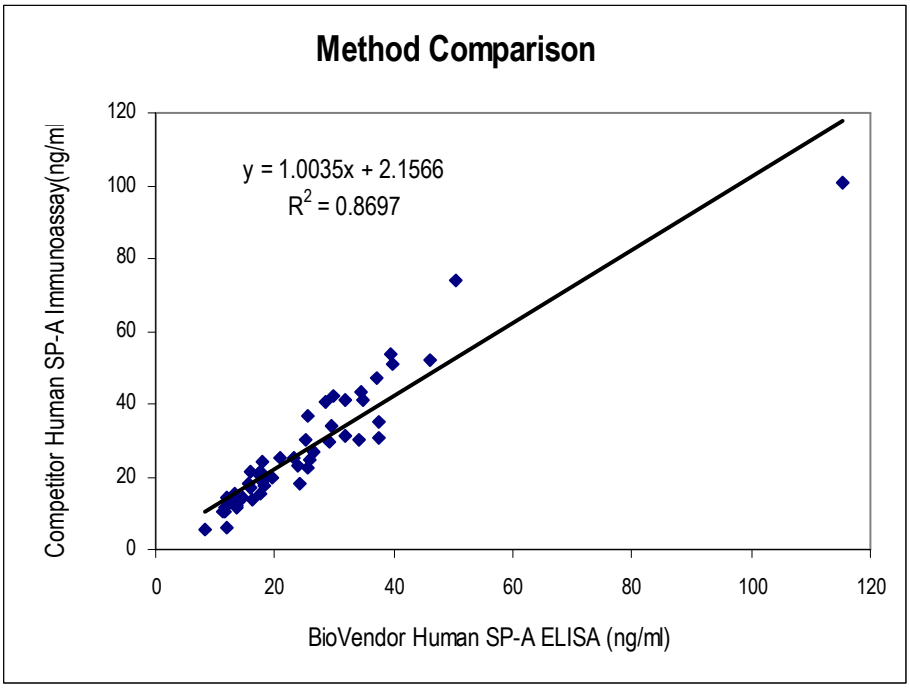


Figure 4: Method comparison.

16. TROUBLESHOOTING AND FAQS

›› Weak signal in all wells

Possible explanations:

- Omission of a reagent or a step
- Improper preparation or storage of a reagent
- Assay performed before reagents were allowed to come to room temperature
- Improper wavelength when reading absorbance

›› High signal and background in all wells

Possible explanations:

- Improper or inadequate washing
- Overdeveloping; incubation time with Substrate Solution should be decreased before addition of Stop Solution
- Incubation temperature over 30°C

›› High coefficient of variation (CV)

Possible explanation:

- Improper or inadequate washing
- Improper mixing Standards, Quality Controls or samples

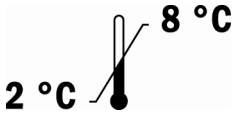
17. REFERENCES

References to surfactant protein A:

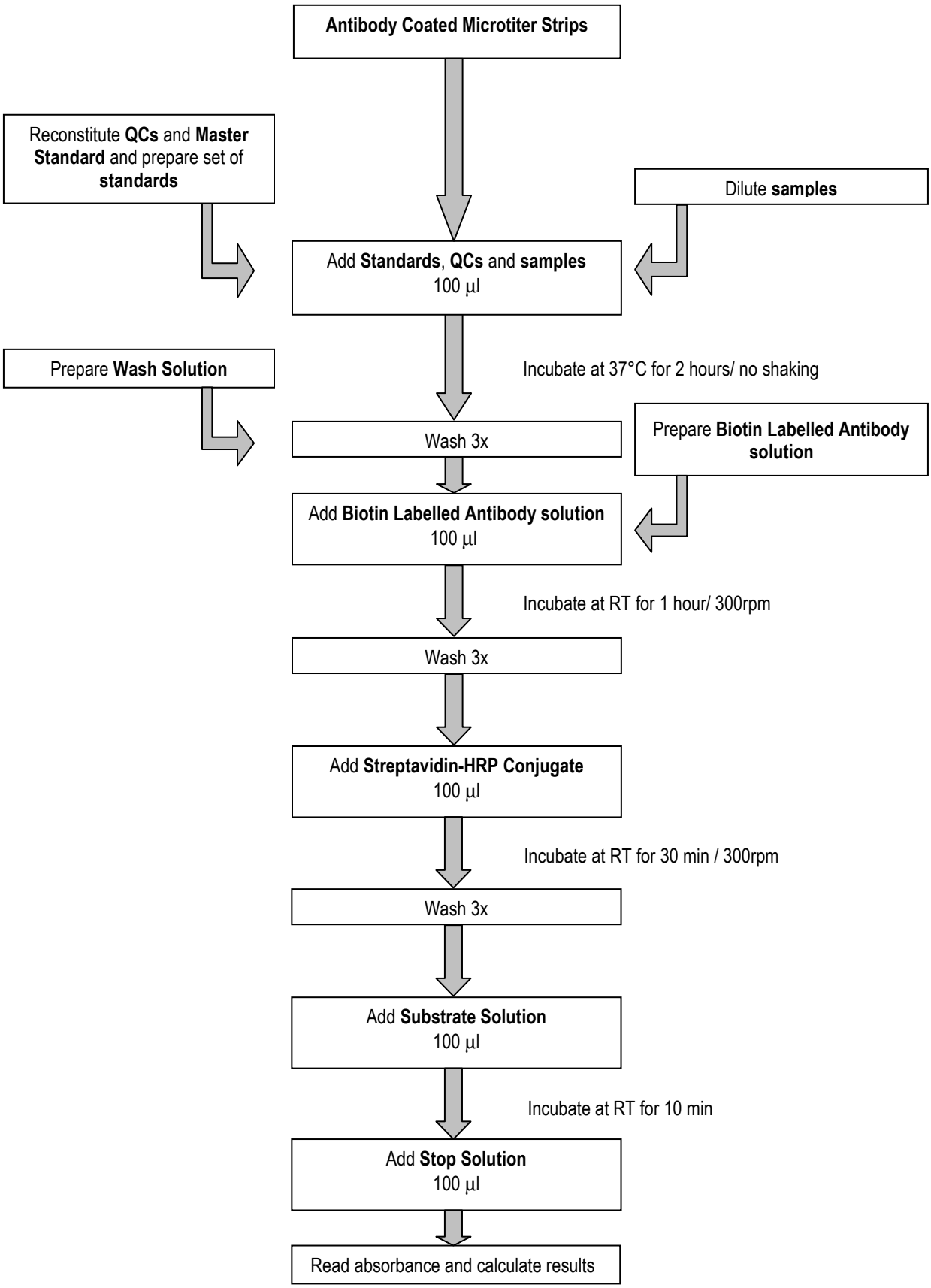
- Doyle IR, Bersten AD, Nicholas TE: Surfactant proteins-A and -B are elevated in plasma of patients with acute respiratory failure. Am J Respir Crit Care Med. 156(4 Pt 1):1217-29 (1997)
- Greene KE, King TE Jr, Kuroki Y, Bucher-Bartelson B, Hunninghake GW, Newman LS, Nagae H, Mason RJ: Serum surfactant proteins-A and -D as biomarkers in idiopathic pulmonary fibrosis. Eur Respir J. 19(3):439-46 (2002)
- Greene KE, Wright JR, Steinberg KP, Ruzinski JT, Caldwell E, Wong WB, Hull W, Whitsett JA, Akino T, Kuroki Y, Nagae H, Hudson LD, Martin TR: Serial changes in surfactant-associated proteins in lung and serum before and after onset of ARDS. Am J Respir Crit Care Med. 160(6):1843-50 (1999)
- Günther A, Schmidt R, Nix F, Yabut-Perez M, Guth C, Rosseau S, Siebert C, Grimminger F, Morr H, Velcovsky HG, Seeger W: Surfactant abnormalities in idiopathic pulmonary fibrosis, hypersensitivity pneumonitis and sarcoidosis. Eur Respir J. 14(3):565-73 (1999)
- Kinder BW, Brown KK, McCormack FX, Ix JH, Kervitsky A, Schwarz MI, King TE Jr.: Serum surfactant protein-A is a strong predictor of early mortality in idiopathic pulmonary fibrosis. Chest. 135(6):1557-63. (2009)
- Kishore U, Greenhough TJ, Waters P, Shrive AK, Ghai R, Kamran MF, Bernal AL, Reid KB, Madan T, Chakraborty T: Surfactant proteins SP-A and SP-D: structure, function and receptors. Mol Immunol. 43(9):1293-315 (2006).
- Kuroki Y, Takahashi M, Nishitani C: Pulmonary collectins in innate immunity of the lung. Cell Microbiol. 9(8):1871-9 (2007)
- Pastva AM, Wright JR, Williams KL. Immunomodulatory roles of surfactant proteins A and D: implications in lung disease. Proc Am Thorac Soc. 4(3):252-7 (2007)
- Phelps DS, Umstead TM, Mejia M, Carrillo G, Pardo A, Selman M: Increased surfactant protein-A levels in patients with newly diagnosed idiopathic pulmonary fibrosis. Chest 125(2):617-25 (2004)
- Sánchez-Barbero F, Strassner J, García-Canero R, Steinhilber W, Casals C: Structural and functional differences among human surfactant proteins SP-A1, SP-A2 and co-expressed SP-A1/SP-A2: role of supratrimeric oligomerization. Biochem J. 406(3): 479-89. (2007)
- Takahashi H, Fujishima T, Koba H, Murakami S, Kurokawa K, Shibuya Y, Shiratori M, Kuroki Y, Abe S: Serum surfactant proteins A and D as prognostic factors in idiopathic pulmonary fibrosis and their relationship to disease extent. Am J Respir Crit Care Med. 162(3 Pt 1):1109-14 (2000)
- Wright JR: Immunoregulatory functions of surfactant proteins. Nat Rev Immunol. 5(1):58-68 (2005)

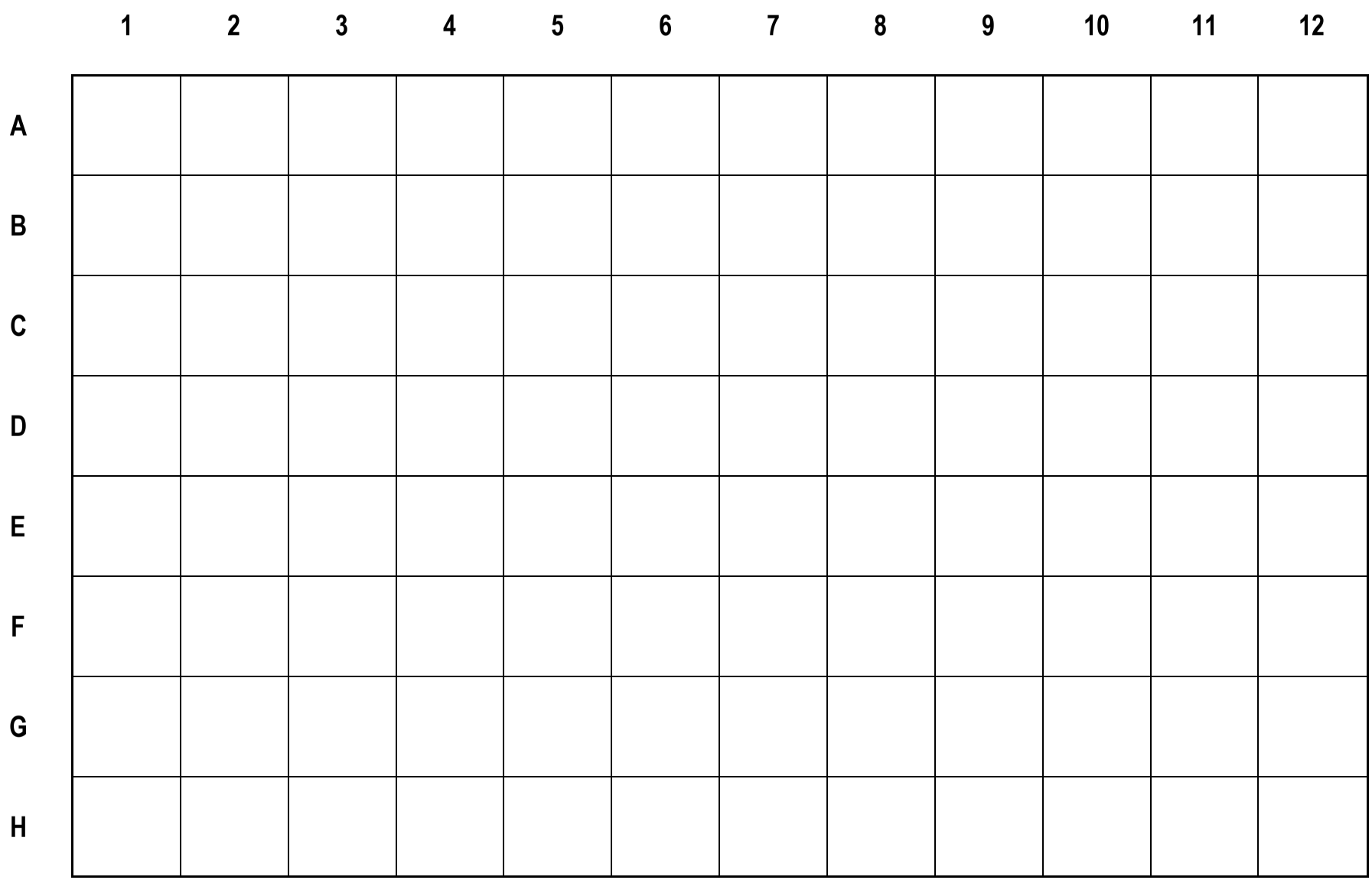
For more references on this product see our WebPages at www.biovendor.com

18. EXPLANATION OF SYMBOLS

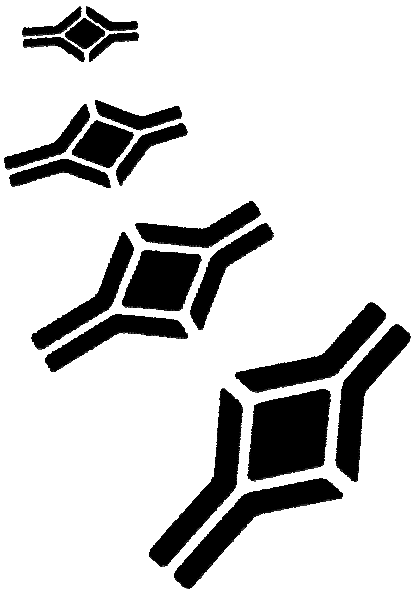
REF	Catalogue number
Cont.	Content
LOT	Lot number
	See instructions for use
	Biological hazard
	Expiry date
	Storage conditions
	Identification of packaging materials

Assay Procedure Summary




1
2
3
4
5
6
7
8
9
10
11
12
A
B
C
D
E
F
G
H

BioVendor
Research
and Diagnostic Products



HEADQUARTERS: **BioVendor - Laboratorní medicína a.s.**	**Karasek 1767/1**	**621 00 Brno** **CZECH REPUBLIC**	**Phone: +420-549-124-185** **Fax: +420-549-211-460**	**E-mail: info@biovendor.com** **Web: www.biovendor.com**
EUROPEAN UNION: BioVendor GmbH	Im Neuenheimer Feld 583	D-69120 Heidelberg GERMANY	Phone: +49-6221-433-9100 Fax: +49-6221-433-9111	E-mail: infoEU@biovendor.com
USA, CANADA AND MEXICO: BioVendor LLC	1463 Sand Hill Road Suite 227	Candler, NC 28715 USA	Phone: +1-828-670-7807 +1-800-404-7807 Fax: +1-828-670-7809	E-mail: infoUSA@biovendor.com
CHINA - Hong Kong Office: BioVendor Laboratories Ltd	Room 4008 Hong Kong Plaza, No.188	Connaught Road West Hong Kong, CHINA	Phone: +852-2803-0523 Fax: +852-2803-0525	E-mail: infoHK@biovendor.com
CHINA – Mainland Office: BioVendor Laboratories Ltd	Room 2917, 29/F R & F Ying Feng Plaza, No.2 Huagiang road	Pearl River New Town Guang Zhou, CHINA	Phone: +86-20-38065519 Fax: +86-20-38065529	E-mail: infoCN@biovendor.com