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Research
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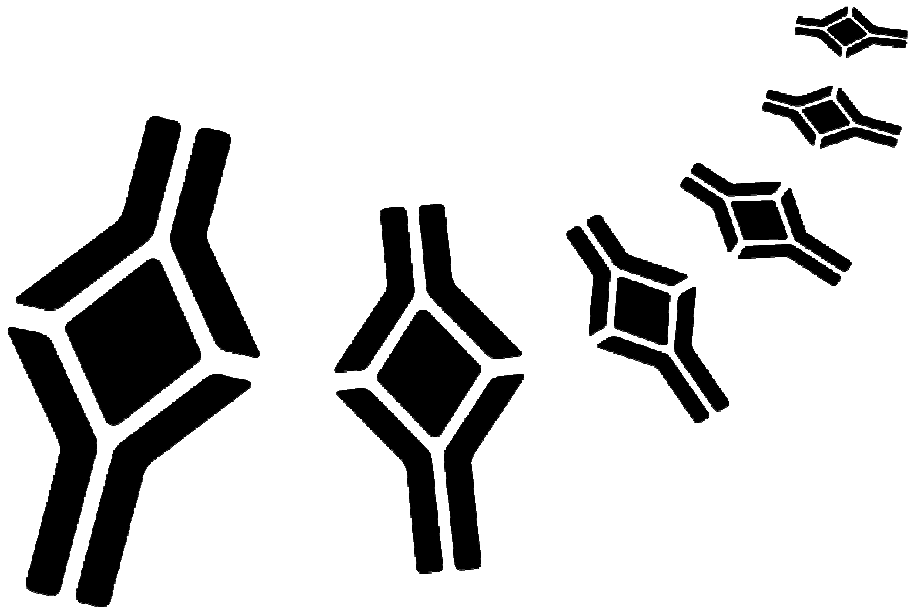

HUMAN LEPTIN ELISA, Clinical Range

Product Data Sheet

Cat No.: RD191001100

European Union: IVD CE

Rest of the world:
For research use only!

VERSION 20 110808 99

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» **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 RD191001100 Human Leptin ELISA, Clinical Range is a sandwich enzyme immunoassay for the quantitative measurement of human leptin.

Features

- **European Union: for in vitro diagnostic use.**
  Rest of the world: for research use only!
- The total assay time is less than 2.5 hours.
- The kit measures total leptin in serum and plasma (EDTA, citrate, heparin) and tissue culture medium.
- Assay format is 96 wells.
- Quality Controls are human serum based. No animal sera are used.
- Standards are recombinant 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

Leptin, the product of the *ob* (obese) gene, is a single-chain 16 kDa protein consisting of 146 amino acid residues. Leptin is produced mainly in the adipose tissue, and is considered to play an important role in appetite control, fat metabolism and body weight regulation. It targets the central nervous system, particularly hypothalamus, affecting food intake. The primary effect of leptin appears to be mediated by leptin receptors expressed mainly in the hypothalamus. In humans, leptin levels correlate with body mass index (BMI) and percentage body fat, and are elevated even in obese individuals. Leptin has a dual action; it decreases the appetite and increases energy consumption, causing more fat to be burned. Leptin is secreted in circadian fashion with nocturnal rise in both lean and obese patients.

Mutations of the *ob* gene resulting in leptin deficiency are the cause of obesity in the *ob/ob* mice. Endogeneous leptin can normalize their body weight. In contrast, high levels of leptin in obese human subjects point to an insensitivity to endogeneous leptin.

Other factors in addition to the amount of body fat appear to regulate leptin action: insulin, glucocorticoids, catecholamines and sex hormones. Studies have shown that leptin may be linked to reproductive function.

4. TEST PRINCIPLE

In the BioVendor Human Leptin ELISA Clinical Range, Standards, Quality Controls and samples are incubated in microplate wells pre-coated with polyclonal anti-human leptin antibody. After 60 minutes incubation and washing, polyclonal anti-human leptin antibody, conjugated with horseradish peroxidase (HRP) is added to the wells and incubated for 60 minutes with captured leptin. Following another washing step, the remaining HRP 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 spectrophotometrically at 450 nm. The absorbance is proportional to the concentration of leptin. 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. REAGENT SUPPLIED

Kit Components	*State*	*Quantity*
Antibody Coated Microtiter Strips	ready to use	96 wells
Conjugate Solution	ready to use	13 ml
Human Leptin Standards (1, 2, 5, 10, 20, 50 ng/ml)	liquid	6x0.35ml
Quality Control High	lyophilized	1 vial
Quality Control Low	lyophilized	1 vial
Dilution Buffer	ready to use	13 ml
Wash Solution Concentrate (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 50-200 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
- 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
- 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 desicant and seal carefully. Remaining Microtiter Strips are stable 3 months stored at 2-8°C and protected from the moisture.

Conjugate solution
Dilution Buffer
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:**

Wash Solution Concentrate (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.

Human Leptin Standards
Dilute each concentration of standard 3x with the Dilution Buffer prior to the assay, e.g. 50 µl of standard + 100 µl of Dilution Buffer for singlets, or preferably 80 µl of standard + 160 µl of Dilution Buffer for duplicates. Mix well (not to foam).
Stability and storage:
Opened standards are stable 3 months when stored at 2-8°C.
Do not store the diluted Standard solutions.

Quality Controls High, Low

Reconstitute each Quality Control (High and Low) with 350 µl of distilled water just prior to the assay. Let it dissolve at least 30 minutes with occasional gentle shaking (not to foam).

Dilute reconstituted Quality Controls 3x with Dilution Buffer, e.g. 50 µl Quality Control + 100 µl Dilution Buffer when assaying samples in singlets, or preferably 80 µl Quality Control + 160 µl Dilution Buffer for duplicates.

Refer to the Certificate of Analysis for current Quality Controls concentrations.

Stability and storage:

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

Do not store the diluted Quality Controls.

10. PREPARATION OF SAMPLES

The kit measures leptin in serum or plasma.

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

Dilute samples 3x with Dilution Buffer just prior to the assay (e.g. 50 µl of sample + 100 µl of Dilution Buffer for singlets, or preferably 80 µl of sample + 160 µl of Dilution Buffer for duplicates). **Mix well** (not to foam). Vortex is recommended.

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 if stored at 2-8°C, effect of freezing/thawing and effect of sample matrix (serum/plasma) on the concentration of leptin.

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.

11. ASSAY PROCEDURE

1. Pipet **100 µl** of diluted Standards, Quality Controls, Dilution Buffer (=Blank) and samples, preferably in duplicates, into the appropriate wells.
2. Incubate the plate at room temperature (ca. 25°C) for **1 hour**, shaking at ca. 300 rpm on an orbital microplate shaker.
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 Conjugate 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 Substrate Solution into each well. Avoid exposing the microtiter plate to direct sunlight. Covering the plate with e.g. aluminium foil is recommended.
8. 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.
9. Stop the colour development by adding **100 µl** of Stop Solution.
10. Determine the absorbance by reading the plate at 450 nm. The absorbance should be read within 5 minutes following step 9.

Note: If the microplate reader is not capable of reading absorbance greater than the absorbance of the highest standard, perform a second reading at 405 nm. A new standard curve, constructed using the values measured at 405 nm, is used to determine leptin concentration of off-scale samples. The readings at 405 nm should not replace the on-scale readings at 450 nm.

	strip 1+2	**strip 3+4**	**strip 5+6**	**strip 7+8**	**strip 9+10**	**strip 11+12**
A	**Standard 50**	Blank	Sample 8	Sample 16	Sample 24	Sample 32
B	**Standard 20**	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	**QC High**	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 at 450 nm (Y) of Standards against log of the known concentration (X) of Standards, using the four-parameter algorithm. Results are reported as concentration of leptin 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.

Samples, Quality Controls and Standards are all diluted 3x prior to analysis, so there is no need to take this dilution factor into account.

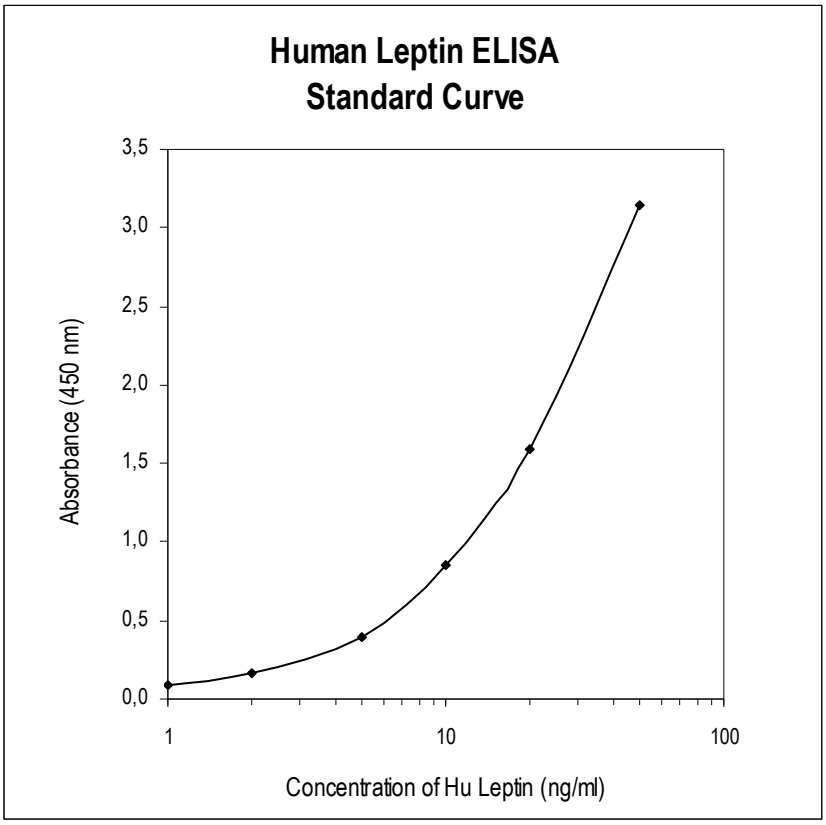

Figure 2: Typical Standard Curve for Human Leptin ELISA, Clinical Range.

13. PERFORMANCE CHARACTERISTICS

Typical analytical data of BioVendor Human Leptin ELISA, Clinical Range are presented in this chapter.

- **Reference ranges**

It is recommended that each laboratory include its own panel of control sample in the assay. Each laboratory should establish its own normal and pathological reference ranges for leptin levels with the assay.

- **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 leptin values in wells and is 0.2 ng/ml.
*Dilution Buffer is pipetted into blank wells.

- **Limit of assay**

Results exceeding leptin level of 50 ng/ml should be repeated with more diluted samples. Dilution factor needs to be taken into consideration in calculating the leptin concentration.

- **Specificity**

The antibodies used in this ELISA are specific for human leptin

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
Goat	yes
Hamster	no
Horse	no
Monkey	no
Mouse	no
Pig	no
Rabbit	no
Rat	no
Sheep	no
Cat	no
Dog	yes

- **Precision**

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

Sample	*Mean (ng/ml)*	*SD (ng/ml)*	*CV (%)*
1	15.01	0.06	4.2
2	3.56	0.02	7.6

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

Sample	*Mean (ng/ml)*	*SD (ng/ml)*	*CV (%)*
1	15.39	1.04	6.7
2	29.34	1.28	4.4

- **Spiking Recovery**

Serum samples were spiked with different amounts of human leptin and assayed.

Sample	***O**bserved (ng/ml)*	***E**xpected (ng/ml)*	*Recovery **O/E** (%)*
1	4.22	-	-
	7.52	8.40	89.5
	11.85	13.37	88.6
	17.41	17.76	98.0
2	14.09	-	-
	17.78	18.27	97.3
	19.92	23.24	85.7
	25.91	27.63	93.8

- **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	-	20.99	-	-
	2x	10.34	10.49	98.5
	4x	5.32	5.25	101.4
	8x	2.45	2.62	93.4
2	-	29.94	-	-
	2x	15.72	14.97	105.0
	4x	7.80	7.49	104.2
	8x	3.83	3.74	102.3

- **Effect of sample matrix**

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

Volunteer No.	Serum *(ng/ml)*	Plasma *(ng/ml)*		
		Heparin	Citrate	EDTA
1	7.72	7.41	6.47	7.13
2	9.05	7.84	6.57	8.95
3	2.54	2.18	1.81	2.32
4	7.08	6.13	5.97	7.47
5	18.71	16.94	13.81	17.55
6	19.64	16.01	15.05	23.39
7	6.42	6.31	5.65	6.76
8	3.97	3.93	3.32	3.36
9	5.67	7.17	6.38	5.84
Mean (ng/ml)	**8.97**	**8.21**	**7.22**	**9.19**
Mean Plasma/Serum (%)	**-**	**91.6**	**80.6**	**102.7**
Correlation. coeff. R^2	**-**	**0.97**	**0.97**	**0.96**

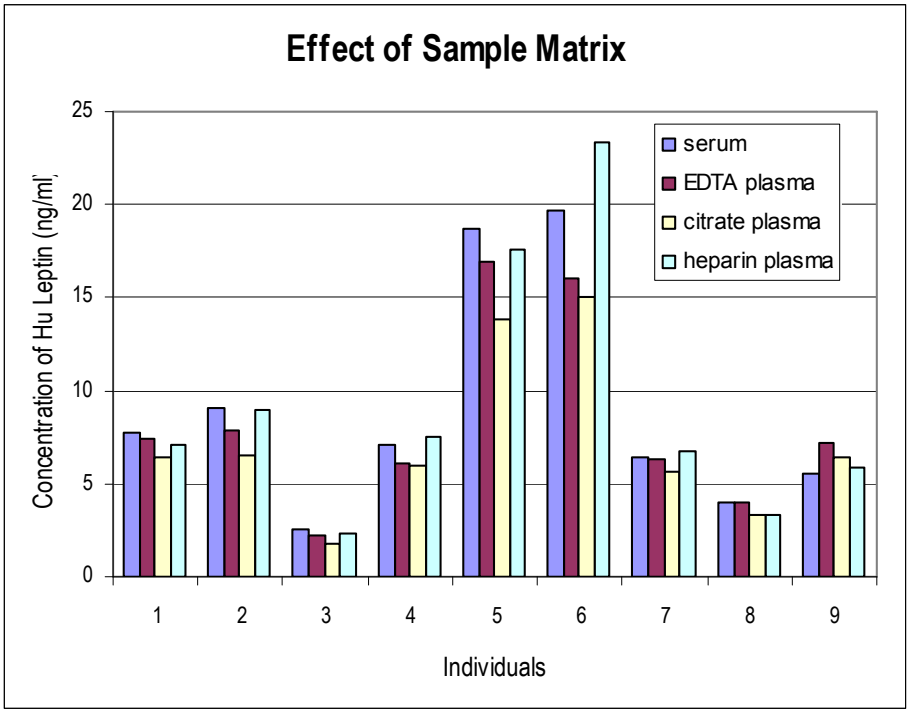

Figure 3: Leptin levels measured using Human Leptin ELISA, Clinical Range from 9 individuals using serum, EDTA, citrate and heparin plasma, respectively.

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

Samples should be stored at –20°C. However, no decline in concentration of leptin 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)*		
			Heparin	Citrate	EDTA
1	-20°C	2.03	2.21	1.79	1.90
	2-8°C, 1 day	2.18	2.21	1.83	1.00
	2-8°C, 7 days	2.26	2.21	1.64	2.28
2	-20°C	3.51	3.54	3.26	3..56
	2-8°C, 1 day	3.65	3.79	3.42	2.95
	2-8°C, 7 days	3.74	3.49	3.19	4.09
2	-20°C	8.76	9.20	7.13	8.94
	2-8°C, 1 day	7.80	8.99	8.19	8.56
	2-8°C, 7 days	7.70	8.03	7.87	8.43

- **Effect of Freezing/Thawing**

No decline was observed in concentration of human leptin 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)*		
			Heparin	Citrate	EDTA
1	1x	5.90	6.05	5.23	5.63
	3x	5.78	5.49	5.40	5.39
	5x	5.64	5.99	5.47	6.14
2	1x	3.09	3.29	2.85	2.86
	3x	3.21	3.28	2.81	2.71
	5x	3.44	3.41	2.72	3.54
3	1x	4.63	5.33	4.71	4.80
	3x	3.73	4.96	4.67	4.61
	5x	4.58	5.39	4.80	4.91

14. DEFINITION OF THE STANDARD

A recombinant protein is used as the standard. The recombinant human leptin is a 16 kDa protein containing 147 amino acid residues.

15. METHOD COMPARISON

The BioVendor Human Leptin ELISA, Clinical Range was compared to a commercial RIA. Linear regression analysis of the results yielded the following results.

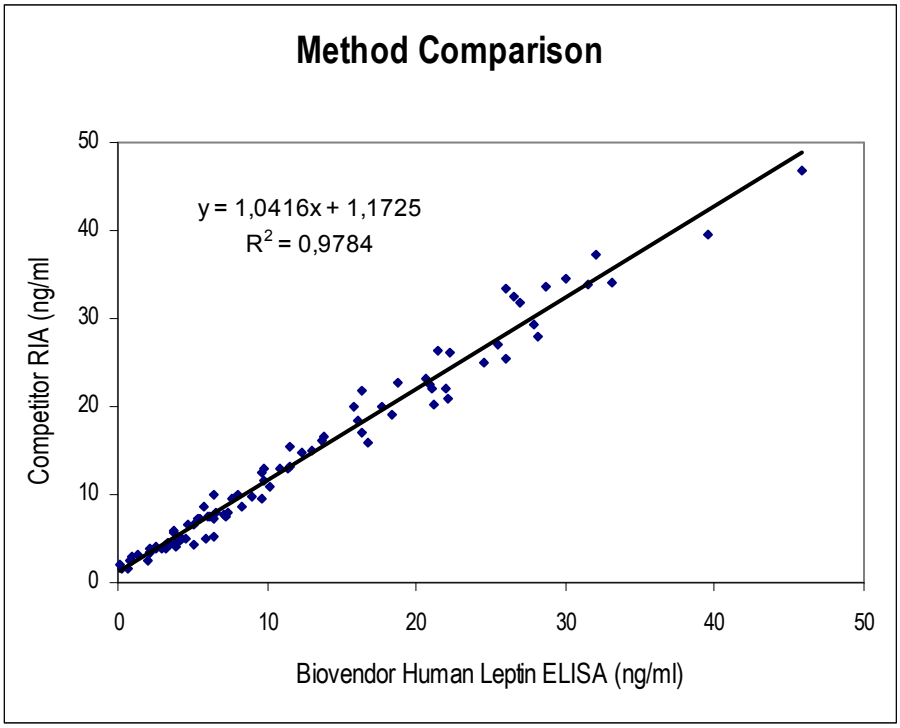

Figure 4: Method comparison

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

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

REF	Catalogue number
Cont.	Content
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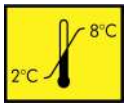
	See instructions for use
	Biological hazard
	Expiry date
	Storage conditions
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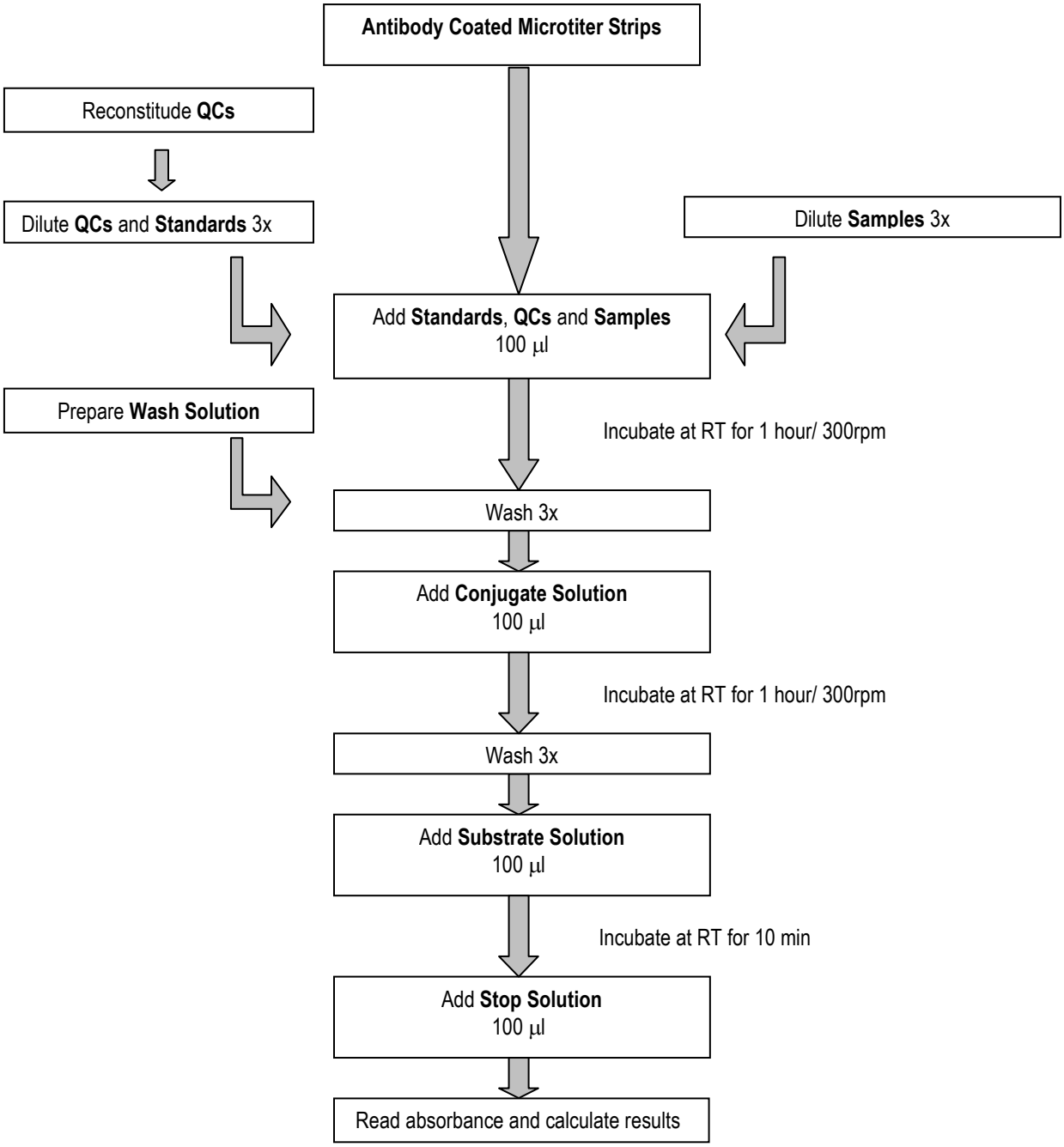
IVD CE	In vitro diagnostic medical device

Assay Procedure Summary



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NOTES

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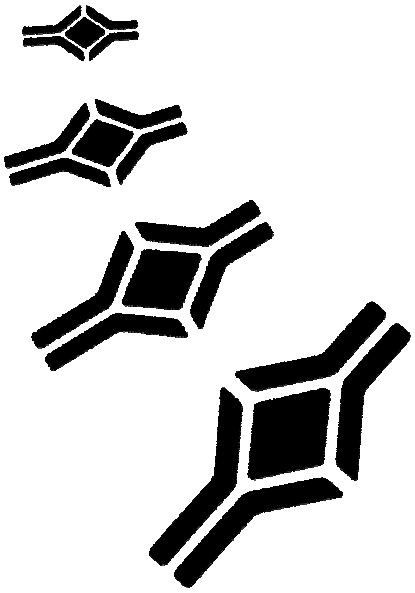
and Diagnostic Products



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