

**BioVendor**

Research  
and Diagnostic Products



## **HUMAN FERRITIN ELISA**

**Product Data Sheet**

**Cat. No.: RCD012R**

**For Research Use Only**

## CONTENTS

---

1.	INTENDED USE	3
2.	PRINCIPLE OF THE TEST	3
3.	CLINICAL APPLICATIONS	3
4.	PROCEDURAL CAUTIONS AND WARNINGS	4
5.	LIMITATIONS	5
6.	SAFETY CAUTIONS AND WARNINGS	5
7.	SPECIMEN COLLECTION AND STORAGE	6
8.	SPECIMEN PRETREATMENT	6
9.	REAGENTS AND EQUIPMENT NEEDED BUT NOT PROVIDED	6
10.	REAGENTS PROVIDED	6
11.	ASSAY PROCEDURE	8
12.	CALCULATIONS	9
13.	TYPICAL TABULATED DATA	9
14.	TYPICAL CALIBRATOR CURVE	9
15.	PERFORMANCE CHARACTERISTICS	10
16.	COMPARATIVE STUDIES	11
17.	EXPECTED NORMAL VALUES	11
18.	REFERENCES	12

➤➤ **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

---

For the direct quantitative determination of Ferritin by enzyme immunoassay in human serum.  
For *research use only*.

## 2. PRINCIPLE OF THE TEST

---

The principle of the following enzyme immunoassay test follows a typical one-step capture or 'sandwich' type assay. The assay makes use of two highly specific monoclonal antibodies: A monoclonal antibody specific for Ferritin is immobilized onto the microwell plate and another monoclonal antibody specific for a different region of Ferritin is conjugated to horse radish peroxidase (HRP). Ferritin from the sample and standards are allowed to bind simultaneously to the plate and to the HRP conjugate. The washing and decanting steps remove any unbound HRP conjugate. After the washing step, the enzyme substrate is added. The enzymatic reaction is terminated by addition of the stopping solution. The absorbance is measured on a microtiter plate reader. The intensity of the colour formed by the enzymatic reaction is directly proportional to the concentration of Ferritin in the sample.

A set of standards is used to plot a standard curve from which the amount of Ferritin in patient samples and controls can be directly read.

## 3. CLINICAL APPLICATIONS

---

Ferritin is a protein which serves as a storage center for iron. It is found in many tissues but the highest concentrations are in the liver, spleen and bone marrow.

The total body iron stores in normal people correlate well with the concentration of Ferritin in serum. If there is a deficiency in iron, that is the concentration of iron is low in the blood, the Ferritin result will be decreased. Likewise, an overload of iron indicates an increase in the level of Ferritin. However, in some conditions such as liver disease Ferritin will be elevated.

## 4. PROCEDURAL CAUTIONS AND WARNINGS

---

1. Users should have a thorough understanding of this protocol for the successful use of this kit. Reliable performance will only be attained by strict and careful adherence to the instructions provided.
2. Control materials or serum pools should be included in every run at a high and low level for assessing the reliability of results.
3. When the use of water is specified for dilution or reconstitution, use deionized or distilled water.
4. In order to reduce exposure to potentially harmful substances, gloves should be worn when handling kit reagents and human specimens.
5. All kit reagents and specimens should be brought to room temperature and mixed gently but thoroughly before use. Avoid repeated freezing and thawing of reagents and specimens.
6. A calibrator curve must be established for every run.
7. The control should be included in every run and fall within established confidence limits.
8. Improper procedural techniques, imprecise pipetting, incomplete washing as well as improper reagent storage may be indicated when assay values for the controls do not reflect established ranges.
9. When reading the microplate, the presence of bubbles in the microwells will affect the optical densities (ODs). Carefully remove any bubbles before performing the reading step.
10. The substrate solution (TMB) is sensitive to light and should remain colourless if properly stored. Instability or contamination may be indicated by the development of a blue colour, in which case it should not be used.
11. When dispensing the substrate and stopping solution, do not use pipettes in which these liquids will come into contact with any metal parts.
12. To prevent contamination of reagents, use a new disposable pipette tip for dispensing each reagent, sample, standard and control.
13. Do not mix various lot numbers of kit components within a test and do not use any component beyond the expiration date printed on the label.
14. Kit reagents must be regarded as hazardous waste and disposed of according to national regulations.

## 5. LIMITATIONS

---

1. All the reagents within the kit are calibrated for the direct determination of Ferritin in human serum. The kit is not calibrated for the determination of Ferritin in saliva, plasma or other specimens of human or animal origin.
2. Do not use grossly hemolyzed, grossly lipemic, icteric or improperly stored serum.
3. Any samples or control sera containing azide or thimerosal are not compatible with this kit, as they may lead to false results.
4. Only calibrator A may be used to dilute any high serum samples. The use of any other reagent may lead to false results.
5. The results obtained with this kit should never be used as the sole basis for clinical diagnosis. For example, the occurrence of heterophilic antibodies in patients regularly exposed to animals or animal products has the potential of causing interferences in immunological tests. Consequently, the clinical diagnosis should include all aspects of a patient's background including the frequency of exposure to animals/products if false results are suspected.
6. Some individuals may have antibodies to mouse protein that can possibly interfere in this assay. Therefore, the results from any patients who have received preparation of mouse antibodies for diagnosis or therapy should be interpreted with caution.

## 6. SAFETY CAUTIONS AND WARNINGS

---

### **Potential Biohazardous Material**

Human serum that may be used in the preparation of the standards and control has been tested and found to be non-reactive for Hepatitis B surface antigen and has also been tested for the presence of antibodies to HCV and Human Immunodeficiency Virus (HIV) and found to be negative. However no test method can offer complete assurance that HIV, HCV and Hepatitis B virus or any infectious agents are absent. The reagents should be considered a potential biohazard and handled with the same precautions as applied to any blood specimen.

### **Chemical Hazards**

Avoid contact with reagents containing TMB, hydrogen peroxide and sulfuric acid. If contacted with any of these reagents, wash with plenty of water. TMB is a suspected carcinogen.

## 7. SPECIMEN COLLECTION AND STORAGE

---

Approximately 0.2 ml of serum is required per duplicate determination. Collect 4-5 ml of blood into an appropriately labelled tube and allow it to clot. Centrifuge and carefully remove the serum layer. Store at 4°C for up to 24 hours or at -10°C or lower if the analyses are to be done at a later date. Consider all human specimens as possible biohazardous materials and take appropriate precautions when handling.

## 8. SPECIMEN PRETREATMENT

---

This assay is a direct system; no specimen pretreatment is necessary.

## 9. REAGENTS AND EQUIPMENT NEEDED BUT NOT PROVIDED

---

1. Precision pipettes to dispense 20, 50, 150, 200 and 300 µl
2. Disposable pipette tips
3. Distilled or deionized water
4. Plate shaker
5. Microwell plate reader with a filter set at 450nm and an upper OD limit of 3.0 or greater\* (see assay procedure step 10).

## 10. REAGENTS PROVIDED

---

### **10.1 Mouse Anti-Ferritin Antibody Coated Microwell Plate-Break Apart Wells**

- Ready To Use.

Contents: One 96 well (12x8) monoclonal antibody-coated microwell plate in a resealable pouch with desiccant.

Storage: Refrigerate at 2-8°C

Stability: 12 months or as indicated on label.

### **10.2 Mouse Anti-Ferritin Antibody-Horseradish Peroxidase (HRP) Conjugate Concentrate 50x**

- Requires Preparation.

Contents: Anti-Ferritin monoclonal antibody-HRP conjugate in a protein-based buffer with a non-mercury preservative.

Volume: 600 µl/vial

Storage: Refrigerate at 2-8°C

Stability: 12 months or as indicated on label.

Preparation: Dilute 1:50 in assay buffer before use (eg. 40 µl of HRP in 2 ml of assay buffer). If the whole plate is to be used dilute 480 µl of HRP in 24 ml of assay buffer. Discard any that is left over.

### 10.3 Ferritin Calibrators - Ready To Use.

Contents: Six vials containing Ferritin in a protein-based buffer with a non-mercury preservative. Prepared by spiking buffer with a defined quantity of Ferritin. Calibrated against World Health Organization (WHO) 3rd IS 94/572.

\*Listed below are approximate concentrations, please refer to the Quality Control Sheet for exact concentrations.

Calibrator	Concentration	Volume
Calibrator A	0 ng/ml	2.0 ml
Calibrator B	10 ng/ml	0.5 ml
Calibrator C	50 ng/ml	0.5 ml
Calibrator D	150 ng/ml	0.5 ml
Calibrator E	400 ng/ml	0.5 ml
Calibrator F	800 ng/ml	0.5 ml

Storage: Refrigerate at 2-8°C

Stability: 12 months in unopened vials or as indicated on label. Once opened, the standards should be used within 14 days or aliquoted and stored frozen. Avoid multiple freezing and thawing cycles.

### 10.4 Controls - Ready To Use.

Contents: Two vials containing Ferritin in a protein-based buffer with a non-mercury preservative. Prepared by spiking buffer with a defined quantity of Ferritin. Refer to vial label for expected value and acceptable range.

Volume: 0.5 ml/vial

Storage: Refrigerate at 2-8°C

Stability: 12 months in unopened vial or as indicated on label. Once opened, the controls should be used within 14 days or aliquoted and stored frozen. Avoid multiple freezing and thawing cycles.

### 10.5 Wash Buffer Concentrate 10x

- Requires Preparation.

Contents: One bottle containing buffer with a non-ionic detergent and a non-mercury preservative.

Volume: 50 ml/bottle

Storage: Refrigerate at 2-8°C

Stability: 12 months or as indicated on label.

Preparation: Dilute 1:10 in distilled or deionized water before use. If the whole plate is to be used dilute 50 ml of the wash buffer concentrate in 450 ml of water.

### **10.6 Assay Buffer - Ready To Use.**

Contents: One vial containing a protein-based buffer with a non-mercury preservative.

Volume: 25 ml/vial

Storage: Refrigerate at 2-8°C

Stability: 12 months or as indicated on label.

### **10.7 TMB Substrate - Ready To Use.**

Contents: One bottle containing tetramethylbenzidine and hydrogen peroxide in a non-DMF or DMSO containing buffer.

Volume: 16 ml/bottle

Storage: Refrigerate at 2-8°C

Stability: 12 months or as indicated on label.

### **10.8 Stopping Solution - Ready To Use.**

Contents: One vial containing 1M sulfuric acid.

Volume: 6 ml/vial

Storage: Refrigerate at 2-8°C

Stability: 12 months or as indicated on label.

## **11. ASSAY PROCEDURE**

---

All reagents must reach room temperature before use. Calibrators, controls and specimen samples should be assayed in duplicate. Once the procedure has been started, all steps should be completed without interruption.

1. Prepare working solutions of the anti-Ferritin-HRP conjugate and wash buffer. See "Reagents Provided" (above) for preparation instructions.
2. Remove the required number of microwell strips. Reseal the bag with any unused strips and return to the refrigerator.
3. Pipette 20 µl of each calibrator, control, and sample into correspondingly labelled wells in duplicate.
4. Pipette 200 µl of the conjugate working solution into each well (We recommend using a multichannel pipette).
5. Incubate on a plate shaker (approximately 200 rpm) for 30 minutes at room temperature.
6. Wash the wells 5 times with 300 µl of diluted wash buffer per well and tap the plate firmly against absorbent paper to ensure that it is dry (The use of a washer is recommended).
7. Pipette 150 µl of TMB substrate into each well at timed intervals.
8. Incubate on a plate shaker for 15-20 minutes at room temperature.
9. Pipette 50 µl of stopping solution into each well at same timed intervals as in step 7.
10. Read the plate on a microwell plate reader at 450 nm within 20 minutes after addition of the stopping solution.

\*If the OD exceeds the upper limit of detection or if a 450nm filter is unavailable, a 405 or 415nm filter may be substituted. The optical densities will be lower, however, this will not affect the results of patient/control samples.



## 12. CALCULATIONS

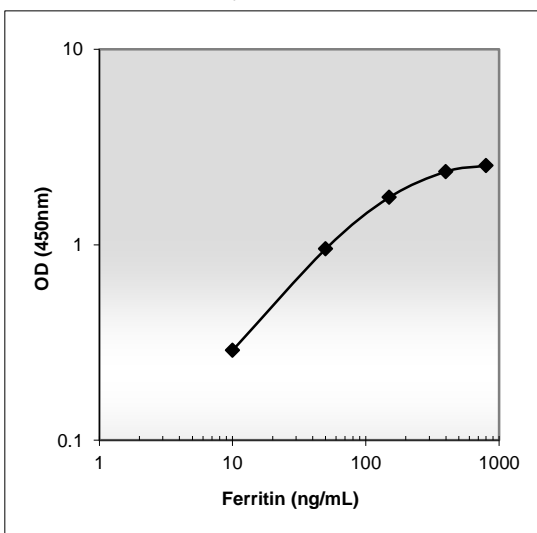
1. Calculate the mean optical density of each calibrator duplicate.
2. Calculate the mean optical density of each unknown duplicate.
3. Subtract the mean absorbance value of the "0" calibrator from the mean absorbance values of the calibrators, controls and serum samples.
4. Draw a calibrator curve on log-log paper with the mean optical densities on the Y-axis and the calibrator concentrations on the X-axis. If immunoassay software is being used, a 4-parameter curve is recommended.
5. Read the values of the unknowns directly off the calibrator curve.
6. If a sample reads more than 800 ng/ml then dilute it with calibrator A at a dilution of no more than 1:8. The result obtained should be multiplied by the dilution factor.

## 13. TYPICAL TABULATED DATA

Calibrator	Mean OD	Value (ng/mL)
A	0.045	0
B	0.288	10
C	0.951	50
D	1.745	150
E	2.365	400
F	2.537	800
Unknown	1.210	74.0

## 14. TYPICAL CALIBRATOR CURVE

Sample curve only. **Do not** use to calculate results.



## 15. PERFORMANCE CHARACTERISTIC

### 15.1 Sensitivity

The limit of detection was determined from the analysis of 40 samples of the blank and a low value sample. Limit of detection = 0.44 ng/mL.

### 15.2 Intra-assay Precision

Three samples were assayed ten times each on the same calibrator curve. The results (in ng/ml) are tabulated below:

Sample	Mean	SD	CV%
1	172.21	6.69	3.9
2	417.23	34.18	8.2
3	923.89	91.20	9.9

### 15.3 Inter-assay Precision

Three samples were assayed ten times over a period of four weeks. The results (in ng/ml) are tabulated below:

Sample	Mean	SD	CV%
1	92.12	6.53	7.1
2	322.73	8.14	2.5
3	1704.63	67.01	3.9

### 15.4 Recovery

Spiked samples were prepared by adding defined amounts of Ferritin to three patient serum samples. The results (in ng/ml) are tabulated below:

Sample	Obs.Result	Exp.Result	Recovery%
1 Unspiked	63.73	-	-
+375	415.25	438.73	94.7
+750	780.68	813.73	95.9
+1500	1266.70	1563.73	81.0
2 Unspiked	69.00	-	-
+375	442.97	444.00	99.8
+750	836.26	819.00	102.1
+1500	1326.73	1569.00	84.6
3 Unspiked	137.64	-	-
+375	484.96	512.64	94.6
+750	955.72	887.64	107.7
+1500	1463.27	1637.64	89.4

### 15.5 Linearity

Three patient serum samples were diluted with calibrator A. The results (in ng/ml) are tabulated below:

Sample	Obs.Result	Exp.Result	Recovery%
1	348.50	-	-
1:2	185.41	174.25	106.4
1:4	100.96	87.13	115.9
1:8	49.74	43.56	114.2
1:16	23.79	21.78	109.2
2	810.22	-	-
1:2	376.80	405.11	93.0
1:4	196.93	202.56	97.2
1:8	105.08	101.28	103.8
1:16	45.10	50.64	89.1
3	1733.54	-	-
1:2	873.38	866.77	100.8
1:4	409.42	433.38	95.5
1:8	192.05	216.69	88.6
1:16	110.62	108.35	102.1

## 16. COMPARATIVE STUDIES

The BioVendor Direct Ferritin ELISA kit (x) was compared with a competitors coated tube RIA kit (y). The comparison of 29 serum samples yielded the following linear regression results:

$$y=1.03x-20.12$$

$$R^2=0.97$$

## 17. EXPECTED NORMAL VALUES

As for all clinical assays each laboratory should collect data and establish their own range of expected normal values.

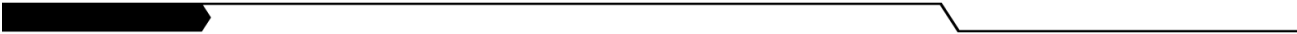
Group	Range (ng/ml)
Healthy normal males and females	25-283

## 18. REFERENCES

---

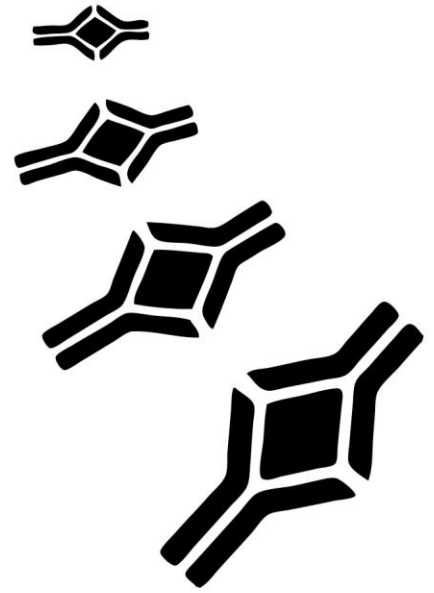
1. Ronald, Ng. H., et al., Three Commercial Methods for Serum Ferritin Compared and the High-Dose "Hook Effect" Eliminated. *Clin. Chem.* 29/6:1109-1113, 1983.
2. Vernon, A. P., et al., Ferritin: A Reliable Assay for Detection of Iron Deficiency. *The Ligand Quarterly* 3/4:15-16., 1980.
3. Goldie, D.J., et al., Measurement of Serum Ferritin by Radioimmunoassay. *Ann. Clin. Biochem.* 15:102-108, 1978.
4. Drysdale, J.W., Ferritin as a Tumor Marker. *J. Clin. Immunoassay* 6/3:234-240., 1983.
5. Luxton, A.W., et al., A Radioimmunoassay for Serum Ferritin. *Clin. Chem.* 23/4:683-689, 1977.
6. Bolton, A.E., et al., Three Different Radioiodination Methods for Human Spleen Ferritin Compared. *Clin. Chem.* 25/10:1826-1830, 1979.
7. Gonyea, L.M., et al., Comparison of Three Procedures for Isolating Human Ferritin, for Use as a Standard in Immunoradiometric Assay. *Clin. Chem.* 22/4:513-518, 1976.
8. Sukanya, L., et al., Sensitive Sandwich Enzyme Immunoassay for Serum Ferritin on Microtitre Plates. *Ann. Clin. Biochem.* 18:48-53, 1981.

NOTES









**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](mailto:info@biovendor.com), [sales@biovendor.com](mailto:sales@biovendor.com)

Web: [www.biovendor.com](http://www.biovendor.com)

There are BioVendor branches and distributors near you.

To find the office closest to you, visit [www.biovendor.com/contact](http://www.biovendor.com/contact)

