

RayBio[®]
Human/Mouse/Rat Resistin
Enzyme Immunoassay Kit

Please Read the Manual Carefully
Before Starting your Experiment

User Manual 2.1
(Revised July 5, 2011)

RayBio[®] Resistin Enzyme
Immunoassay Kit Protocol

(Cat#: EIA-RES-1)



We Provide You With Excellent
Protein Array System and Service

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RayBiotech, Inc.

**RayBio® Human/Mouse/Rat Resistin Enzyme
Immunoassay Kit Protocol**

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I. INTRODUCTION

Resistin is a 12.5 kDa cysteine-rich hormone secreted by adipose tissue. It is also known as XCP-1 (CEBPE regulated myeloid-specific secreted cysteine-rich protein precursor 1), FIZZ3 (found in inflammatory zone 3), or ADSF (adipocyte-specific secretory factor). The length of the resistin is 108 amino acids in humans, and 114 amino acids in mouse and rat; the molecular weight is ~12.5 kDa. Resistin is an adipokine with physiologic role regarding its involvement with obesity and type II diabetes mellitus (T2DM).

Resistin has a high sequence homology among species (43% in a mature protein). Crystal structures of resistin reveal an unusual composition of several subunits that are held together by non-covalent interactions which make up its structure. Each protein subunit comprises a carboxy-terminal disulfide-rich Beta-sandwich "head" domain and an amino-terminal alpha-helical "tail" segment. The globular domain from resistin contains five disulfide bonds.

Some studies have shown the important role of resistin linking obesity to T2DM. The underlying belief among those in support of this theory is that serum resistin levels will increase with increased adiposity. Conversely, serum resistin levels have been found to decline with decreased adiposity following medical treatment. This fact takes on significant implications considering the well understood link between central obesity and insulin resistance; marked peculiarities of T2DM. Furthermore, many studies have shown the positive correlations between resistin levels and insulin resistance, and a direct correlation between resistin levels and subjects with T2DM, indicating that such serum resistin increases are accountable for the insulin resistance apparently associated with increased adiposity. In addition to its role in insulin resistance in obese subjects, resistin also plays a role in inflammation and energy homeostasis.

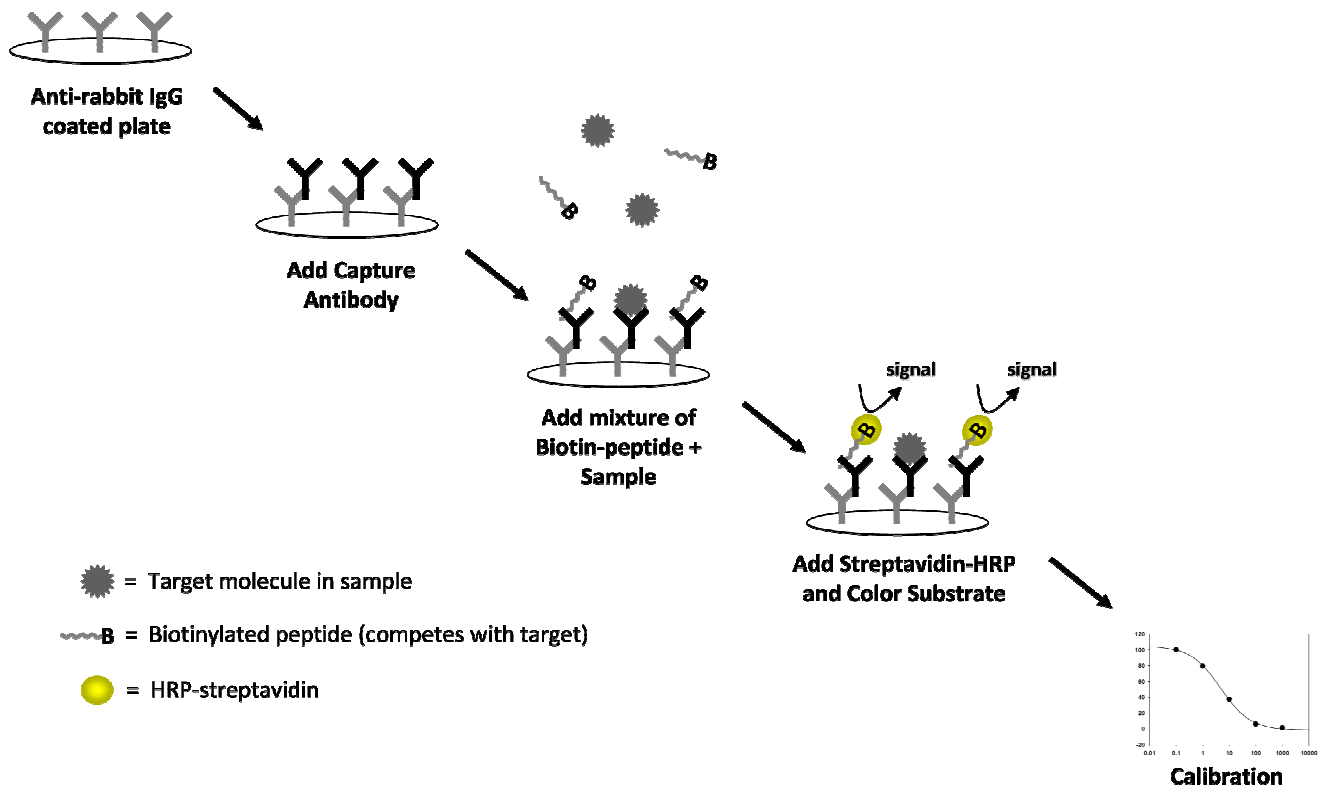
II. GENERAL DESCRIPTION

The RayBio® Resistin Enzyme Immunoassay (EIA) Kit is an in vitro quantitative assay for detecting Resistin peptide based on the principle of Competitive Enzyme Immunoassay.

The microplate in the kit is pre-coated with anti-rabbit secondary antibody. After a blocking step and incubation of the plate with anti-Resistin antibody, both biotinylated Resistin peptide and peptide standard or targeted peptide in samples interacts competitively with the Resistin antibody. Uncompeted (bound) biotinylated Resistin peptide then interacts with Streptavidin-horseradish peroxidase (SA-HRP), which catalyzes a color development reaction. The intensity of colorimetric signal is directly proportional to the amount of biotinylated peptide-SA-HRP complex and inversely proportional to the amount of Resistin peptide in the standard or samples. This is due to the competitive binding to Resistin antibody between biotinylated Resistin peptide and peptides in standard or samples. A standard curve of known concentration of Resistin peptide can be established and the concentration of Resistin peptide in the samples can be calculated accordingly.

EIA-RES-1 detects Resistin (90aa). No other active isoforms have been reported.

Principle of Competitive EIA



III. REAGENTS

1. Resistin Microplate (Item A): 96 wells (12 strips x 8 wells) coated with secondary antibody.
2. Wash Buffer Concentrate (20x) (Item B): 25 ml
3. Standard Resistin Peptide (Item C): 2 vials, 10 μ l/vial
4. Anti-Resistin polyclonal antibody (Item N): 2 vials, 5 μ l/vial
5. Assay Diluent A (Item D): 30 ml, contains 0.09% sodium azide as preservative. Diluent for standards and serum or plasma samples.
6. Assay Diluent B (Item E): 15 ml of 5x concentrated buffer. Diluent for standards and cell culture media or other sample types.
7. Biotinylated Resistin peptide, (Item F): 2 vials, 20 μ l/vial
8. HRP-Streptavidin concentrate (Item G): 8 μ l 8,000x concentrated HRP-conjugated Streptavidin.
9. Positive control (Item M): 1 vial, 100 μ l
10. TMB One-Step Substrate Reagent (Item H): 12 ml of 3, 3', 5, 5'- tetramethylbenzidine (TMB) in buffered solution.
11. Stop Solution (Item I): 8 ml of 2 M sulfuric acid.
12. Assay Diagram (Item J).
13. User Manual (Item K)

IV. STORAGE

- Standard, Biotinylated Resistin peptide, and Positive Control should be stored at -20 °C or -80 °C (recommended at -80 °C) after arrival. **Avoid multiple freeze-thaws.**
- The remaining kit components may be stored at -20 °C.
- Opened Microplate Wells and antibody (Item N) may be stored for up to 1 month at 2° to 8 °C. Return unused wells to the pouch containing desiccant pack and reseal along entire edge.
- If stored in this manner, RayBiotech warrants this kit for 6 months from the date of shipment.

V. ADDITIONAL MATERIALS REQUIRED

1. Microplate reader capable of measuring absorbance at 450nm.
2. Precision pipettes to deliver 2 μ l to 1 ml volumes.
3. Adjustable 1-25 ml pipettes for reagent preparation.
4. 100 ml and 1 liter graduated cylinders.
5. Absorbent paper.
6. Distilled or deionized water.
7. SigmaPlot software (or other software which can perform four-parameter logistic regression models)
8. Tubes to prepare standard or sample dilutions.
9. Orbital shaker
10. Aluminum foil
11. Saran Wrap

VI. REAGENT PREPARATION

If testing plasma or serum samples, use Assay Diluent A to dilute Item F and Item C. If testing cell culture media or other sample types, use Assay Diluent B to dilute Item F and Item C. For sample and positive control dilutions, refer to steps 6, 7, 8 and 10 of Reagent Preparation.

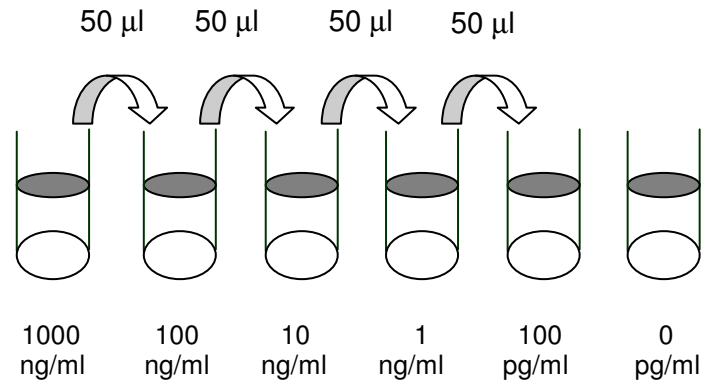
1. Keep kit reagents on ice during reagent preparation steps. Equilibrate plate to room temperature before opening the sealed pouch.
2. Assay Diluent B (Item E) should be diluted 5-fold with deionized or distilled water.
3. Briefly centrifuge the Anti-Resistin Antibody vial (Item N) before use. Add 50 μ l of 1x Assay Diluent B into the vial to prepare a detection antibody concentrate. Pipette up and down to mix gently.

4. The antibody concentrate should then be diluted 100-fold with 1x Assay Diluent B. This is your anti-Resistin antibody working solution, which will be used in step 2 of the Assay Procedure.

NOTE: the following steps may be done during the antibody incubation procedure (step 2 of Assay Procedure).

5. Briefly centrifuge the vial of Biotinylated Resistin (Item F) before use. Add 5 μ l of Item F to 5 ml of the appropriate Assay Diluent. Pipette up and down to mix gently. *The final concentration of biotinylated Resistin will be 10 ng/ml.* This solution will only be used as the diluent in step 6 of Reagent Preparation.
6. Preparation of Standards: Label 6 microtubes with the following concentrations: 1000 ng/ml, 100 ng/ml, 10 ng/ml, 1 ng/ml, 100 pg/ml and 0 pg/ml. Pipette 450 μ l of biotinylated Resistin solution into each tube, except for the 1000 ng/ml (leave this one empty). *It is very important to make sure the concentration of biotinylated Resistin is 10 ng/ml in all standards.*
 - a. Briefly centrifuge the vial of Resistin (Item C). In the tube labeled 1000 ng/ml, pipette 8 μ l of Item C and 792 μ l of 10 ng/ml biotinylated Resistin solution (prepared in step 5 above). This is your Resistin stock solution (1000 ng/ml Resistin, 10 ng/ml biotinylated Resistin). Mix thoroughly. This solution serves as the first standard.
 - b. To make the 100 ng/ml standard, pipette 50 μ l of Resistin stock solution the tube labeled 100 ng/ml. Mix thoroughly.
 - c. Repeat this step with each successive concentration, preparing a dilution series as shown in the illustration below. Each time, use 450 μ l of biotinylated Resistin and 50 μ l of the prior concentration until 100 pg/ml is reached. Mix each tube thoroughly before the next transfer.

d. The final tube (0 pg/ml Resistin, 10 ng/ml biotinylated Resistin) serves as the zero standard (or total binding).



7. Prepare a 10-fold dilution of Item F. To do this, add 2 μl of Item F to 18 μl of the appropriate Assay Diluent. This solution will be used in steps 8 and 10.
8. Positive Control Preparation: briefly centrifuge the positive control vial (Item M). To the tube of Item M, add 101 μl 1x Assay Diluent B. Also add 2 μl of 10-fold diluted Item F (prepared in step 7) to the tube. This is a 2-fold dilution of the positive control. Mix thoroughly. The positive control is a cell culture medium sample with an expected signal between 10% and 30% of total binding (70-90% competition) if diluted as described above. It may be diluted further if desired, but be sure the final concentration of biotinylated Resistin is 10 ng/ml.
9. If Item B (20X Wash Concentrate) contains visible crystals, warm to room temperature and mix gently until dissolved. Dilute 20 ml of Wash Buffer Concentrate into deionized or distilled water to yield 400 ml of 1X Wash Buffer.






10. Sample Preparation: Use Assay Diluent A + biotinylated Resistin to dilute serum/plasma samples. For cell culture medium and other sample types, use 1X Assay Diluent B + biotinylated Resistin as the diluent. *It is very important to make sure the final concentration of the biotinylated Resistin is 10 ng/ml in every sample.* EXAMPLE: to make a 4-fold dilution of sample, mix together 2.5 μ l of 10-fold diluted Item F (prepared in step 7), 185 μ l of appropriate Assay Diluent, and 62.5 μ l of your sample; mix gently. The total volume is 250 μ l, enough for duplicate wells on the microplate.
Do not use Item F diluent from Step 5 for sample preparation. If you plan to use undiluted samples, you must still add biotinylated Resistin to a final concentration of 10 ng/ml. EXAMPLE: Add 2.5 μ l of 10-fold diluted Item F to 247.5 μ l of sample. NOTE: Optimal sample dilution factors should be determined empirically, however you may contact technical support (888-494-8555; techsupport@raybiotech.com) to obtain recommended dilution ranges for serum or plasma.
11. Briefly centrifuge the HRP-Streptavidin vial (Item G) before use. The HRP-Streptavidin concentrate should be diluted 8,000-fold with 1X Assay Diluent B.
For example: For an 8000-fold dilution of HRP-Streptavidin solution, briefly spin the vial (Item G) and pipette up and down to mix gently . Add 2 μ l of HRP-Streptavidin concentrate into a tube with 198 μ l 1X Assay Diluent B to prepare a 100-fold diluted HRP-Streptavidin solution (don't store the diluted solution for next day use). Mix thoroughly and then pipette 100 μ l of prepared 100-fold diluted solution into a tube with 8 ml 1x Assay Diluent B to prepare a final 8,000-fold diluted HRP-Streptavidin solution.
Note: Do not use Assay Diluent A for HRP-Streptavidin preparation in Step 11.

VII. ASSAY PROCEDURE:

1. Keep kit reagents on ice during reagent preparation steps. It is recommended that all standards and samples be run at least in duplicate.
2. Add 100 μ l anti-Resistin antibody (see Reagent Preparation step 4) to each well. Incubate for 1.5 hours at room temperature with gentle shaking (1-2 cycles/sec). You may also incubate overnight at 4 degrees C.
3. Discard the solution and wash wells 4 times with 1x Wash Buffer (200-300 μ l each), Washing may be done with a multichannel pipette or an automated plate washer. Complete removal of liquid at each step is essential to good assay performance. After the last wash, remove any remaining Wash Buffer by aspirating or decanting. Invert the plate and blot it against clean paper towels.
4. Add 100 μ l of each standard (see Reagent Preparation step 6), positive control (see Reagent Preparation step 8) and sample (see Reagent Preparation step 10) into appropriate wells. Be sure to include a blank well (Assay Diluent only). Cover wells and incubate for 2.5 hours at room temperature with gentle shaking (1-2 cycles/sec) or overnight at 4°C.
5. Discard the solution and wash 4 times as directed in Step 3.
6. Add 100 μ l of prepared HRP-Streptavidin solution (see Reagent Preparation step 11) to each well. Incubate for 45 minutes with gentle shaking at room temperature. It is recommended that incubation time should not be shorter or longer than 45 minutes.
7. Discard the solution and wash 4 times as directed in Step 3.

8. Add 100 μ l of TMB One-Step Substrate Reagent (Item H) to each well. Incubate for 30 minutes at room temperature in the dark with gentle shaking (1-2 cycles/sec).
9. Add 50 μ l of Stop Solution (Item I) to each well. Read absorbances at 450 nm immediately.

VIII. ASSAY PROCEDURE SUMMARY

1. Prepare all reagents, samples and standards as instructed.

2. Add 100 μ l anti-Resistin antibody to each well. Incubate 1.5 hours at room temperature or overnight at 4°C .

3. Add 100 μ l standard or sample to each well. Incubate 2.5 hours at room temperature or overnight at 4°C.

4. Add 100 μ l prepared streptavidin solution. Incubate 45 minutes at room temperature.

5. Add 100 μ l TMB One-Step Substrate Reagent to each well. Incubate 30 minutes at room temperature.

6. Add 50 μ l Stop Solution to each well. Read at 450 nm immediately

IX. CALCULATION OF RESULTS

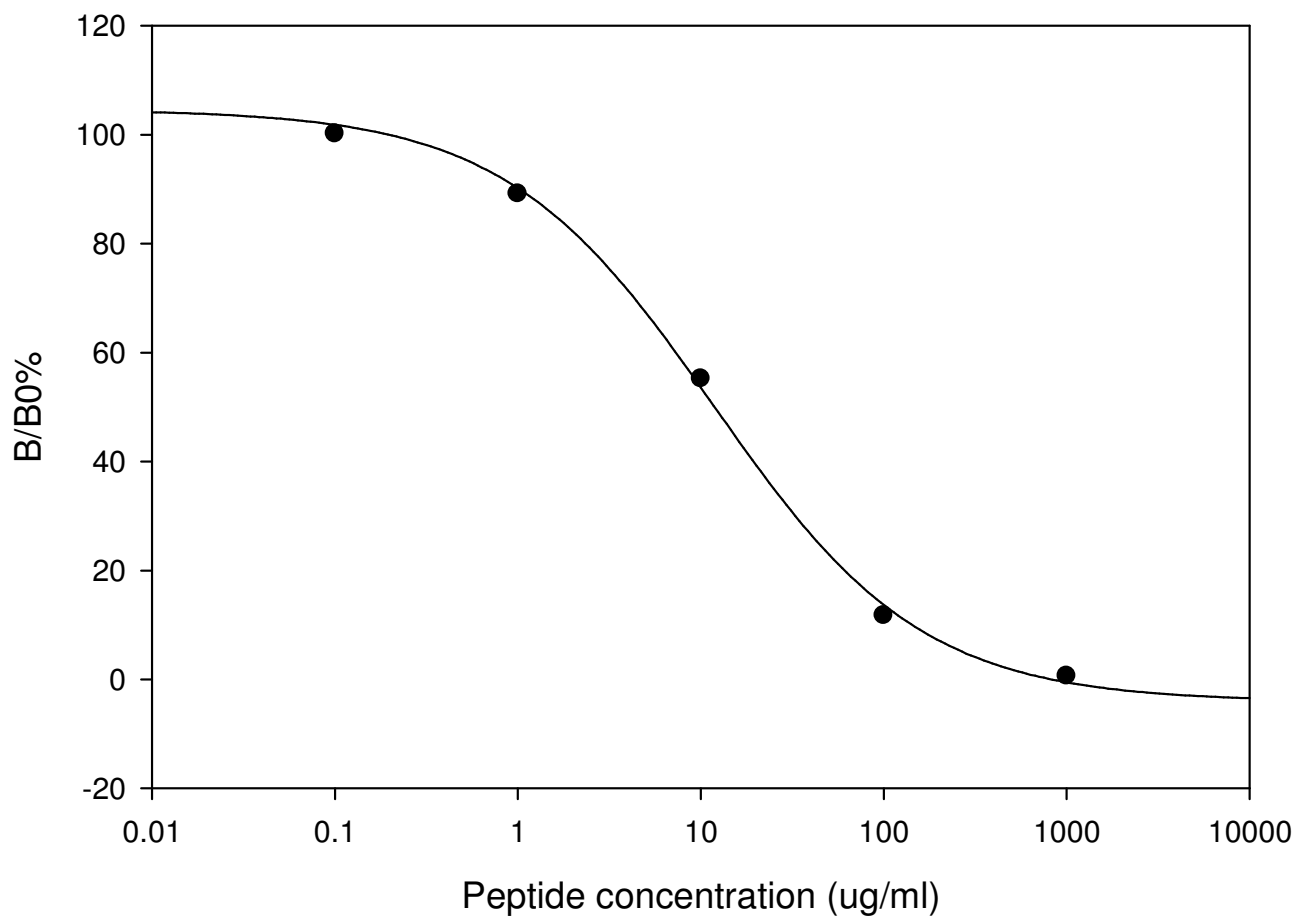
Calculate the mean absorbance for each set of duplicate standards, controls and samples, and subtract the blank optical density. Plot the standard curve using SigmaPlot software (or other software which can perform four-parameter logistic regression models), with standard concentration on the x-axis and percentage of absorbance (see calculation below) on the y-axis. Draw the best-fit straight line through the standard points.

Percentage absorbance = $(B - \text{blank OD}) / (B_0 - \text{blank OD})$ where
B = OD of sample or standard and
B₀ = OD of zero standard (total binding)

A. TYPICAL DATA

These standard curves are for demonstration only. A standard curve must be run with each assay.

Resistin EIA



B. SENSITIVITY

The minimum detectable concentration of Resistin is 446 pg/ml.

C. DETECTION RANGE

0.1-1,000 ng/ml

D. REPRODUCIBILITY

Intra-Assay: CV<10%

Inter-Assay: CV<15%

X. SPECIFICITY

Cross Reactivity: This ELISA kit shows no cross-reactivity with any of the cytokines tested: Ghrelin, Nesfatin, Angiotensin II, NPY and APC.

XI. REFERENCES

1. Patel SD, Rajala MW, Rossetti L, Scherer PE, Shapiro L (2004). "Disulfide-dependent multimeric assembly of resistin family hormones". *Science (journal)* **304** (5674): 1154–8.
2. Steppan CM, Bailey ST, Bhat S, Brown EJ, Banerjee RR, Wright CM, Patel HR, Ahima RS, Lazar MA (January 2001). "The hormone resistin links obesity to diabetes". *Nature* **409** (6818): 307–12.
3. McTernan CL, McTernan PG, Harte AL, Levick PL, Barnett AH, Kumar S (January 2002). "Resistin, central obesity, and type 2 diabetes". *Lancet* **359** (9300): 46–7.

XII. TROUBLESHOOTING GUIDE

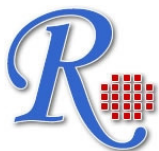
Problem	Cause	Solution
1. Poor standard curve	<ol style="list-style-type: none"> 1. Inaccurate pipetting 2. Improper standard dilution 	<ol style="list-style-type: none"> 1. Check pipettes 2. Ensure briefly spin the vial of Item C and dissolve the powder thoroughly by a gentle mix.
2. Low signal	<ol style="list-style-type: none"> 1. Too brief incubation times 2. Inadequate reagent volumes or improper dilution 	<ol style="list-style-type: none"> 1. Ensure sufficient incubation time; assay procedure step 2 change to over night 2. Check pipettes and ensure correct preparation
3. Large CV	<ol style="list-style-type: none"> 1. Inaccurate pipetting 	<ol style="list-style-type: none"> 1. Check pipettes
4. High background	<ol style="list-style-type: none"> 1. Plate is insufficiently washed 2. Contaminated wash buffer 	<ol style="list-style-type: none"> 1. Review the manual for proper wash. If using a plate washer, check that all ports are unobstructed. 2. Make fresh wash buffer
5. Low sensitivity	<ol style="list-style-type: none"> 1. Improper storage of the EIA kit 2. Stop solution 	<ol style="list-style-type: none"> 1. Store your standard at $\leq -20^{\circ}\text{C}$ after receipt of the kit. 2. Stop solution should be added to each well before measure

RayBio® EIA kits:

If you are interested in other EIA kits, please visit www.raybiotech.com for details.

Notes:

This product is for research use only.



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