



HUMAN GHRELIN (TOTAL) ELISA KIT 96-Well Plate (Cat. # EZGRT-89K)

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HUMAN GHRELIN (TOTAL) ELISA KIT

I. INTENDED USE

This kit is used for the non-radioactive quantification of total human ghrelin (both intact and des-octanoyl forms) in serum and plasma. Circulating ghrelin is a multifunctional hormone produced primarily by the stomach. It consists of 28 amino acids and the n-octanoylation of serine3 position in the molecule is necessary for its bioactivity. Originally found as an endogenous ligand for the growth hormone secretagogue receptor in the pituitary gland, it distinguishes itself from the hypothalamic growth hormone-releasing hormone as another potent stimulator for growth hormone secretion. It is also an important orexigenic hormone in the regulation of energy homeostasis. One kit is sufficient to measure 39 unknown samples in duplicate.

This kit is for research purpose only.

II. PRINCIPLES OF ASSAY

This assay is a Sandwich ELISA based on: 1) capture of human ghrelin molecules (both active and des-octanoyl forms) in the sample by anti-human ghrelin IgG and immobilization of the resulting complex to the wells of a microtiter plate coated by a pre-titered amount of anchor antibodies, 2) and the simultaneous binding of a second biotinylated antibody to ghrelin, 3) wash away of unbound materials, followed by conjugation of horseradish peroxidase to the immobilized biotinylated antibodies, 4) wash away of free enzyme, and 5) quantification of immobilized antibody-enzyme conjugates by monitoring horseradish peroxidase activities in the presence of the substrate 3,3',5,5'-tetramethylbenzidine. The enzyme activity is measured spectrophotometrically by the increased absorbency at 450 nm, corrected from the absorbency at 590nm, after acidification of formed products. Since the increase in absorbency is directly proportional to the amount of captured total human ghrelin in the unknown sample, the concentration of total ghrelin can be derived by interpolation from a reference curve generated in the same assay with reference standards of known concentrations of human ghrelin.

III. REAGENTS SUPPLIED

Each kit is sufficient to run one 96-well plate and contains the following reagents:

1. Microtiter Plate

Coated with pre-titered anchor antibodies.

Quantity: 1 Strip Plate

Preparation: Ready to use.

Note: Unused strips should be resealed in the foil pouch with the dessicant provided and stored at 2-8 °C.

2. Adhesive Plate Sealer

Quantity: 2 sheets

Preparation: Ready to use.

3. 10X HRP Wash Buffer Concentrate

10X concentrate of 50 mM Tris Buffered Saline containing Tween-20.

Quantity: 2 bottles containing 50 mL each

Preparation: Dilute 1:10 with distilled or de-ionized water.

4. Human Ghrelin (Total) Standard

Human Ghrelin (total) reference standard, 5 ng/mL, lyophilized

Quantity: 1 bottle, 5 ng/mL after reconstitution with appropriate amount of water.

Preparation: Hydrate thoroughly in distilled or de-ionized water immediately before use. Please refer to the analysis sheet for exact amount of water to be used since it will be lot dependent. After hydration dilute with Assay Buffer according to § VIII. A.

5. Human Ghrelin (Total) Quality Controls 1 and 2

One vial each, lyophilized, containing human ghrelin (total) at two different levels.

Quantity: 0.5 mL/vial upon hydration

Preparation: Reconstitute each vial with 0.5 mL de-ionized water immediately before use. Aliquot unused portion in smaller quantity and freeze at -20°C for later use. Avoid further freeze and thaw.

6. Human Ghrelin (Total) Matrix

Processed serum matrix containing 0.08% Sodium Azide

Quantity: 1 mL/vial

Preparation: Ready to use.

III. REAGENTS SUPPLIED (continued)

7. Assay Buffer

0.05 M phosphosaline, pH 7.4, containing 0.025 M EDTA, 0.05 % Triton X-100, 0.08% sodium azide, and 0.1% BSA.

Quantity: 15 mL/vial

Preparation: Ready to use.

8. Human Ghrelin (Total) Capture Antibody

Pre-titered capture antibody solution in buffer

Quantity: 3 mL/vial

Preparation: Mix thoroughly with Human Ghrelin (Total) Detection Antibody before use according to § VIII. C.

9. Human Ghrelin (Total) Detection Antibody

Pre-titered detection antibody solution in buffer

Quantity: 3 mL/vial

Preparation: Mix thoroughly with Human Ghrelin (Total) Capture Antibody before use according to § VIII. C.

10. Enzyme Solution

Pre-titered streptavidin-horseradish peroxidase conjugate in buffer.

Quantity: 12 mL/vial

Preparation: Ready to use

11. Substrate

3, 3',5,5'-tetramethylbenzidine in buffer.

Quantity: 12 mL/vial

Preparation: **Ready to use. Minimize the exposure to light.**

12. Stop Solution

0.3 M HCl

Quantity: 12 mL/vial

Preparation: **Ready to use.**

Caution: Corrosive Solution

IV. STORAGE AND STABILITY

All components of the kit should be stored at 4°C. Prepare and use standard/QC solutions within a day after reconstitution and aliquot in smaller quantity and store at ≤ -20°C for later use, if necessary. Avoid further freeze/thaw cycles. Refer to expiration dates on all reagents prior to use. Do not mix reagents from different kits unless they have the same lot numbers.

V. REAGENT PRECAUTIONS

1. Sodium Azide

Sodium Azide has been added to certain reagents as a preservative at a concentration of 0.08%. Although it is at a minimum concentration, Sodium Azide may react with lead and copper plumbing to form explosive metal azides. On disposal, flush with large volume of water to prevent azide build up.

2. Hydrochloric Acid

Hydrochloric Acid is corrosive, can cause eye and skin burns. Harmful if swallowed. Causes respiratory and digestive tract burns. Avoid contact with skin and eye. Do not swallow or ingest.

VI. MATERIALS REQUIRED BUT NOT PROVIDED

1. Pipettes and pipette tips: 10 μ L ~ 20 μ L or 20 μ L ~ 100 μ L
2. Multi-channel Pipettes and pipette tips: 5 ~ 50 μ L and 50 ~ 300 μ L Buffer and Reagent Reservoirs
3. Vortex Mixer
4. De-ionized Water
5. Microtiter Plate Reader capable of reading absorbency at 450 nm and 590nm
6. Orbital Microtiter Plate Shaker
7. Absorbent Paper or Cloth
8. Pefabloc or AEBSF [4-(2-Aminoethyl)-benzenesulfonyl fluoreide], 100 mg/mL aqueous stock solution (store at -20°C, minimize multiple freeze/thaw cycles) is recommended for use in Sample Collection and Storage.
9. 5N HCl, recommended for Sample Collection and Storage.

VII. SAMPLE COLLECTION AND STORAGE

The active ghrelin molecule is extremely unstable in serum/plasma and should be rigorously protected during blood sample collection. Ideally all samples should be processed as quickly as possible and kept on ice to retard the breakdown of active ghrelin. For maximum protection, we recommend addition of Pefabloc or AEBSF and acidification of all samples. Neat samples without such treatment exhibit ~30% (range 20% ~ 60%) less total ghrelin content than samples that have been protected. Acidification will result in noticeable protein precipitation but does not affect the assay. However, if the presence of precipitates interferes with the sample pipetting accuracy, the sample should be centrifuged and the supernatant used for assay.

1. To prepare serum, whole blood is directly drawn into a Vacutainer® serum tube that contains no anti-coagulant. Immediately add enough AEBSF to a final concentration of 1 mg/mL. Let blood clot at room temperature for 30 min.
2. Promptly centrifuge the clotted blood at 2,000 to 3,000 x g for 15 minutes at $4 \pm 2^{\circ}\text{C}$.
3. Transfer serum samples in separate tubes and acidify with HCl to a final concentration of 0.05N. Aliquot acidified serum in small quantities. Date and identify each sample.
4. Use freshly prepared serum or store samples at $-20 \pm 5^{\circ}\text{C}$ for later use. Avoid multiple (> 5) freeze/thaw cycles.
5. To prepare plasma sample, whole blood should be collected into Vacutainer® EDTA-plasma tubes and treated with AEBSF as described for serum, followed by immediate centrifugation. Acidify plasma samples with HCl to a final concentration of 0.05N. Observe same precautions in the preparation of serum samples.
6. If heparin is to be used as anti-coagulant, the effect on the assay outcome at the dose of heparin used should be pre-determined.
7. Avoid using samples with gross hemolysis or lipemia.

VIII. REAGENT PREPARATION

A. Standard Preparation

1. Use care in opening the lyophilized Standard vial. Using a pipette, reconstitute the Human Ghrelin (Total) Standard with the amount of distilled or deionized water specified in the data sheet supplied with this kit to give a final concentration of 5 ng/mL (or 5000 pg/mL) of Total Ghrelin Standard. Invert and mix gently until completely in solution.
2. Label five tubes with the additional concentrations of standards to be prepared: 100 pg/mL, 200 pg/mL, 500 pg/mL, 1000 pg/mL, and 2000 pg/mL. Add Assay Buffer to each of the five tubes according to the volumes outlined in the chart below. Dilute the reconstituted 5 ng/mL standard stock according to the chart below. Vortex each tube briefly to ensure complete mixing.

Note: Change tip for every dilution. Wet tip with standard before dispensing. Unused portions of standard should be stored in small aliquots at $\leq -20^{\circ}\text{C}$. Avoid multiple freeze/thaw cycles.

Concentration of Standards	Volume of 5 ng/mL Stock to Add	Volume of Assay Buffer to Add
100 pg/mL	0.020 mL	0.980 mL
200 pg/mL	0.040 mL	0.960 mL
500 pg/mL	0.100 mL	0.900 mL
1,000 pg/mL	0.200 mL	0.800 mL
2,000 pg/mL	0.400 mL	0.600 mL
5,000 pg/mL	----	----

B. Quality Control 1 and 2 Preparation

Use care in opening the lyophilized Quality Control vials. Reconstitute each Human Ghrelin (Total) Quality Control 1 and Quality Control 2 with 0.5 mL distilled or deionized water and gently invert to ensure complete hydration. Unused portions of the reconstituted Quality Controls should be stored in small aliquots at $\leq -20^{\circ}\text{C}$. Avoid further freeze/thaw cycles.

C. Preparation of Capture and Detection Antibody Mixture

Prior to use, combine the entire contents of Human Ghrelin (Total) Capture Antibody (3mL) and Human Ghrelin (Total) Detection Antibody (3mL) at a 1:1 ratio and invert to mix thoroughly.

IX. HUMAN GHRELIN (TOTAL) ELISA ASSAY PROCEDURE

Pre-warm all reagents to room temperature immediately before setting up the assay.

1. Dilute the 10X concentrated HRP wash buffer 10 fold by mixing the entire contents of both buffer bottles with 900 mL de-ionized or glass distilled water.
2. Remove the required number of strips from the Microtiter Assay Plate. Unused strips should be resealed in the foil pouch and stored at 2-8°C. Assemble the strips in an empty plate holder and fill each well with 300 µL diluted Wash Buffer. Decant wash buffer and remove the residual amount by inverting the plate and tapping it smartly onto absorbent towels several times. Wash assay plate using this procedure 2 additional times. **Do not let wells dry before proceeding to the next step.** If an automated machine is used for the assay, follow the manufacturer's instructions for all washing steps described in this protocol.
3. Add 20 µL Matrix Solution to Blank, Standards and Quality Control wells (refer to § X for suggested well orientations).
4. Add 30 µL assay buffer to each of the Blank and sample wells.
5. Add 10 µL assay buffer to each of the Standard and Quality Control wells.
6. Add in duplicate 20 µL Ghrelin Standards in the order of ascending concentrations to the appropriate wells.
7. Add in duplicate 20 µL QC1 and 20 µL QC2 to the appropriate wells.
8. Add sequentially 20 µL of the unknown samples in duplicate to the remaining wells.
9. Transfer the Antibody Solution Mixture (1:1 mixture of capture and detection antibody) to a buffer/reagent reservoir and add 50 µL to each well with a multi-channel pipette.
10. Cover the plate with plate sealer and incubate at room temperature for 2 hours on an orbital microtiter plate shaker set to rotate at moderate speed, about 400 to 500 rpm.
11. Remove plate sealer and decant solutions from the plate. Tap as before to remove residual solutions in well.
12. Wash wells 3 times with diluted Wash Buffer, 300 µL per well per wash. Decant and tap after each wash to remove residual buffer.

IX. HUMAN GHRELIN (TOTAL) ELISA ASSAY PROCEDURE (continued)

13. Add 100 μ L Enzyme Solution to each well. Cover plate with sealer and incubate with moderate shaking at room temperature for 30 min on the micro-titer plate shaker.
14. Remove sealer, decant solutions from the plate and tap plate to remove the residual fluid.
15. Wash wells 6 times with diluted Wash Buffer, 300 μ L per well per wash. Decant and tap after each wash to remove residual buffer.
16. Add 100 μ L of Substrate solution to each well, cover plate with sealer and shake in the plate shaker for approximately 5-20 minutes. Blue color should be formed in wells of Ghrelin standards with intensity proportional to increasing concentrations of Ghrelin.

(Note: Please be aware that the color may develop more quickly or more slowly than the recommended incubation time depending on the localized room temperature. Please visually monitor the color development to optimize the incubation time.)

Remove sealer and add 100 μ L stop solution [**CAUTION: CORROSIVE SOLUTION**] and shake plate by hand to ensure complete mixing of solution in all wells. The blue color should turn into yellow after acidification. Read absorbance at 450 nm and 590nm in a plate reader within 5 minutes and ensure that there is no air bubbles in any well.

Assay Procedure for Human Ghrelin (Total) ELISA Kit (Cat. #EZGRT-89K)

	Step 1	Step 2	Step 3	Step 4-5	Step 6-8	Step 9	Step 10-12	Step 13	Step 14-15	Step 16			
Well #	Dilute both bottles of 10X HRP Wash Buffer with 900 mL de-ionized water.	Wash plate 3X with 300 µl diluted HRP Wash Buffer. Remove residual buffer by tapping smartly on absorbent towels	Matrix Solution	Assay Buffer	Standards/QCs/ Samples	Capture/ Detection Ab. Mixture	Seal, Agitate, Incubate 2 hours at Room Temperature. Wash 3X with 300 µl Wash Buffer.	Enzyme Solution	Seal, Agitate, Incubate 30 minutes at Room Temperature. Wash 6X with 300 µl Wash Buffer.	Substrate	Seal, Agitate, Incubate 5-20 minutes at Room Temperature.	Stop Solution	Read Absorbance at 450 nm and 590 nm.
A1, B1			20 µl	30 µl	--	50 µl		100 µl		100 µl			
C1, D1			20 µl	10 µl	20 µl of 100 pg/mL Standard	↓		↓		↓		↓	
E1, F1			20 µl	10 µl	20 µl of 200 pg/mL Standard								
G1, H1			20 µl	10 µl	20 µl of 500 pg/mL Standard								
A2, B2			20 µl	10 µl	20 µl of 1000 pg/mL Standard								
C2, D2			20 µl	10 µl	20 µl of 2000 pg/mL Standard								
E2, F2			20 µl	10 µl	20 µl of 5000 pg/mL Standard								
G2, H2			20 µl	10 µl	20 µl of QC 1								
A3, B3			20 µl	10 µl	20 µl of QC 2								
C3, D3			--	30 µl	20 µl of Sample 1								
E3, F3			--	30 µl	20 µl of sample 2								
G3, H3 Etc.			--	30 µl	20 µl of sample 3								

X. MICROTITER PLATE ARRANGEMENT

Human Ghrelin (Total) ELISA

	1	2	3	4	5	6	7	8	9	10	11	12
A	Blank	1000 pg/mL	QC2	Etc.								
B	Blank	1000 pg/mL	QC2	Etc.								
C	100 pg/mL	2000 pg/mL	Sample 1									
D	100 pg/mL	2000 pg/mL	Sample 1									
E	200 pg/mL	5000 pg/mL	Sample 2									
F	200 pg/mL	5000 pg/mL	Sample 2									
G	500 pg/mL	QC1	Sample 3									
H	500 pg/mL	QC1	Sample 3									

XI. CALCULATIONS

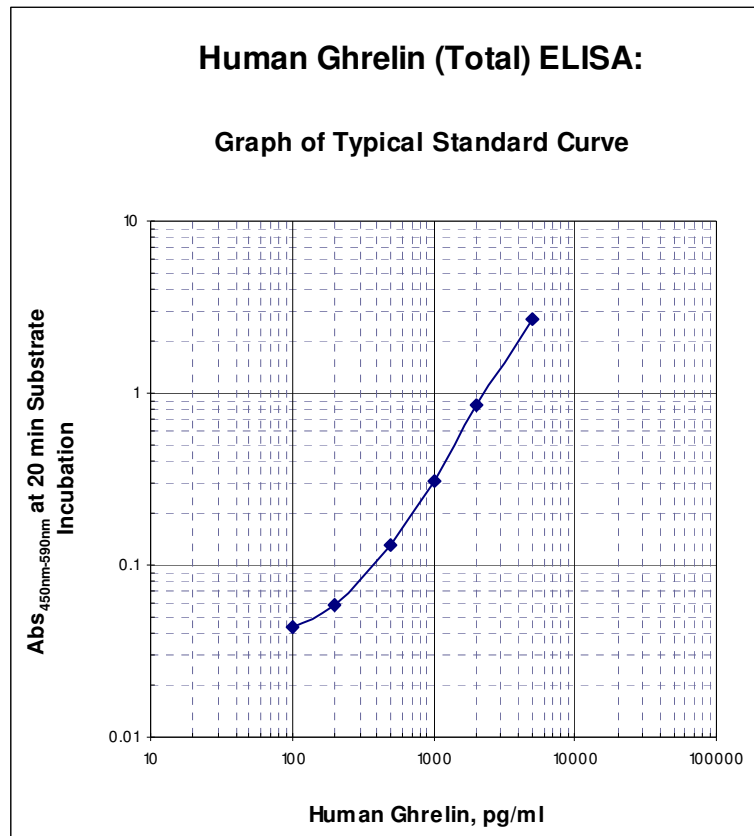
Graph a reference curve by plotting the absorbance unit of 450nm, less unit at 590nm, on the Y-axis against the concentrations of Ghrelin standard on the X-axis. The dose-response curve of this assay fits best to a sigmoidal 4- or 5-parameter logistic equation. The results of unknown samples can be calculated with any computer program having a 4- or 5-parameter logistic function.

Note: When sample volumes assayed differ from 20 μL , an appropriate mathematical adjustment must be made to accommodate for the dilution factor (e.g., if 10 μL of sample is used, then calculated data must be multiplied by 2). When sample volume assayed is less than 20 μL , compensate the volume deficit with matrix solution.

XII. INTERPRETATION

1. The assay will be considered accepted when all Quality Control values fall within the calculated QC range. If any QCs fall outside of the control range, review results with a supervisor.
2. If the difference between duplicate results of a sample is $>15\%$ CV, repeat the sample.
3. The theoretical minimal detecting concentration of this assay is 100 pg/mL Total Ghrelin (20 μL sample size).
4. The appropriate range of this assay is 100 pg/mL to 5,000 pg/mL Total Ghrelin (20 μL sample size). Any result greater than 5,000 pg/mL in a 20 μL sample should be diluted using matrix solution and the assay repeated until the results fall within range.

XIII. GRAPH OF TYPICAL REFERENCE CURVE



For Demonstration Only – Do not use for calculations

XIV. ASSAY CHARACTERISTICS

A. Sensitivity

The lowest level of Total Ghrelin that can be detected by this assay is 100 pg/mL when using a 20 μ L sample size.

XIV. ASSAY CHARACTERISTICS (continued)

B. Specificity

Human Ghrelin (Active)	80%
Des-Octanoyl Human Ghrelin	100%
Canine Ghrelin (Active)	70%
Porcine Ghrelin (Active)	0%
Motilin Related Peptide (Human, Rat/Mouse)	0%
PYY 3~36 (Human, Mouse, Porcine)	0%
NPY (Human/Rat)	0%
Pancreatic Polypeptide (Human, Rat)	0%
Human GIP (1~42)	0%
Human GIP (3~42)	0%
Human Insulin	0%
Human Leptin	0%
Human GLP-1	0%
Human C-peptide	0%
Human Amylin	0%
Glucagon	0%
Rat/Mouse Ghrelin (Active)	52%*
Des-Octanoyl Rat/Mouse Ghrelin	54%*

* Purified ghrelin only. This kit should not be used for ghrelin assay in rat/mouse serum or plasma.

C. Precision

Intra and Inter-Assay Variations

Sample	Total Ghrelin (pg/mL) Mean, n = 6	Intra-assay CV (%)	Inter-assay CV (%)
#1, serum	384.6	1.26	7.81
#2, serum	904.5	0.90	6.28
#3, serum	1,522.4	0.99	6.18
#4, plasma	272.1	1.76	7.74
#5, plasma	868.4	1.11	5.18
#6, plasma	1,346.7	1.91	6.53

The assay variations of Human Ghrelin (Total) ELISA kits were studied on three fasting human serum and plasma samples with varying concentrations of endogenous ghrelin. Intra-assay variations were calculated from results of six duplicate determinations in one assay. Inter-assay variations were calculated from results of six separate assays with duplicate samples in each assay.

XIV. ASSAY CHARACTERISTICS (continued)

D. Spike Recovery Rate of Total Human Ghrelin in Assay Samples

Sample I.D.	Ghrelin Spiked, pg/mL	Serum Ghrelin		Plasma Ghrelin	
		pg/mL	Recovery Rate	pg/mL	Recovery rate
1	0 (Basal)	101	--	115	--
	250	298	79%	312	79%
	1,000	868	77%	877	76%
	2,000	1,528	71%	1,571	73%
2	0 (Basal)	397	--	298	--
	250	662	103%	553	102%
	1,000	1,536	100%	1,291	99%
	2,000	2,677	99%	2,196	95%
3	0 (Basal)	842	--	712	--
	250	1,072	92%	913	81%
	1,000	1,708	87%	1,561	85%
	2,000	2,564	86%	2,408	85%
MEAN ± S.D. (n = 3)	250	X	91.3 ± 12.0%	X	87.3 ± 12.7%
	1,000	X	88.0 ± 11.5%	X	86.7 ± 11.6%
	2,000	X	85.3 ± 14.0%	X	84.3 ± 11.0%
1	0 (Basal)	124	--	85	--
	250	347	89%	365	112%
	1,000	1,051	93%	1,140	106%
	2,000	1,922	90%	2,088	100%
2	0 (Basal)	397	--	312	--
	250	662	106%	609	119%
	1,000	1,536	114%	1,600	129%
	2,000	2,677	114%	2,887	129%
3	0 (Basal)	886	--	703	--
	250	1,155	108%	992	116%
	1,000	2,031	115%	1,910	121%
	2,000	3,086	110%	3,057	118%
MEAN ± S.D. (n = 3)	250	X	101.0 ± 10.4%	X	115.7 ± 3.50%
	1,000	X	107.3 ± 12.4%	X	118.7 ± 11.7%
	2,000	X	104.7 ± 12.9%	X	112.3 ± 15.0%

Varying amounts of active or des-octanoyl human ghrelin were added to 3 post-prandial human serum and plasma samples and the ghrelin content of each sample was assayed by Human Ghrelin (Total) ELISA. The recovery rate = [(Observed ghrelin concentration after spike – Basal ghrelin level) / spiked ghrelin concentration] x 100%.

XIV. ASSAY CHARACTERISTICS (continued)

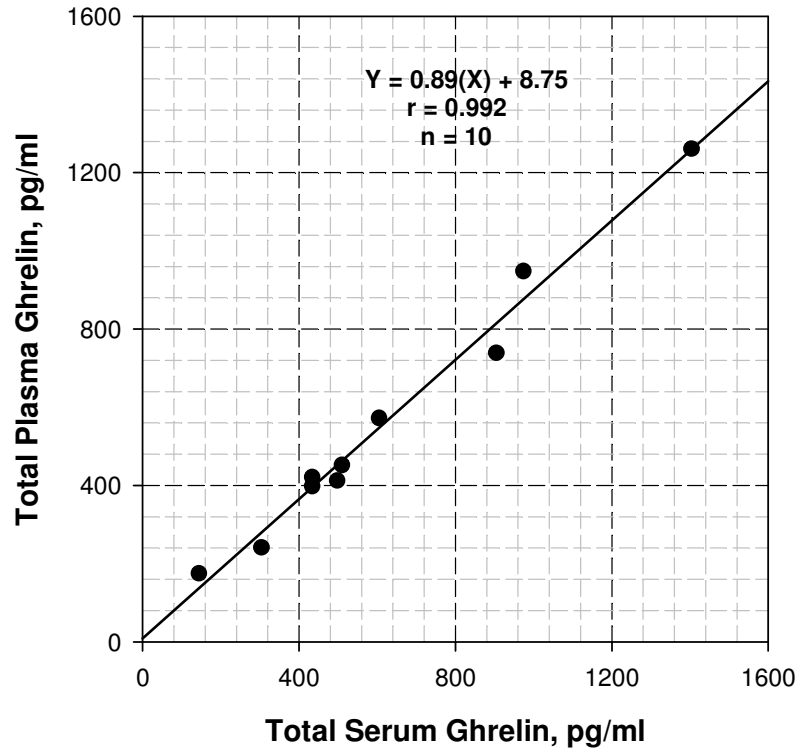
E. Linearity of Sample Dilution

Sample I.D.	Volume Assayed	Serum Ghrelin		Plasma Ghrelin	
		pg/mL	% of Expected	pg/mL	% of Expected
1	20 µl	719	100%	598	100%
	15 µl	511	95%	431	96%
	10 µl	352	98%	294	98%
	5 µl	192	107%	176	118%
2	20 µl	1,100	100%	1,060	100%
	15 µl	796	96%	723	91%
	10 µl	520	94%	484	91%
	5 µl	276	100%	263	99%
3	20 µl	421	100%	369	100%
	15 µl	300	95%	269	97%
	10 µl	200	95%	200	108%
	5 µl	113	107%	123	133%
MEAN ± S.D. (n = 3)	20 µl		100%		100%
	15 µl		95.3 ± 0.6%		94.7 ± 3.2%
	10 µl		95.7 ± 2.1%		99.0 ± 8.5%
	5 µl		104.7 ± 4.0%		116.7 ± 17%

Fasting serum and plasma samples from 3 individuals were assayed at 20, 15, 10 and 5 µL each for total ghrelin by ELISA. Measured ghrelin levels are corrected for various dilution factors and then divided by levels found at 20 µL sample size to obtain the % of expected values.

XV. NORMAL RANGE OF TOTAL GHRELIN LEVELS IN HUMAN BLOOD

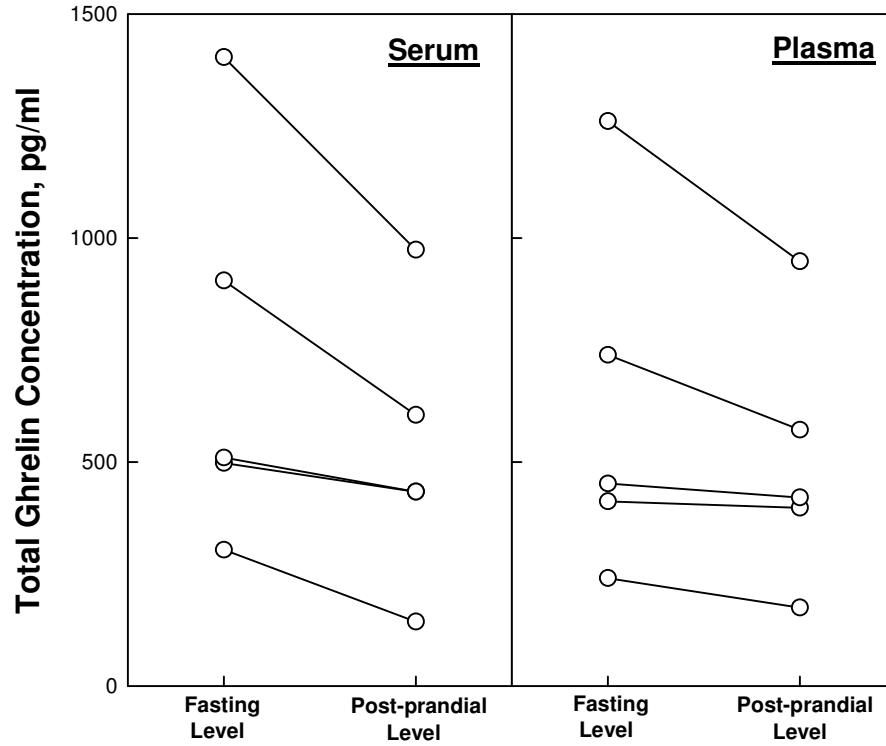
Human Ghrelin (Total) ELISA: Correlation Between Serum and Plasma Concentrations



Fasting and post-prandial serum and plasma samples from 5 individuals were assayed for total ghrelin by ELISA and the paired results are analyzed by linear regression analysis.

XVI. POST-PRANDIAL ATTENUATION OF TOTAL GHRELIN IN BLOOD

Post-meal Attenuation of Total Ghrelin Level in Blood

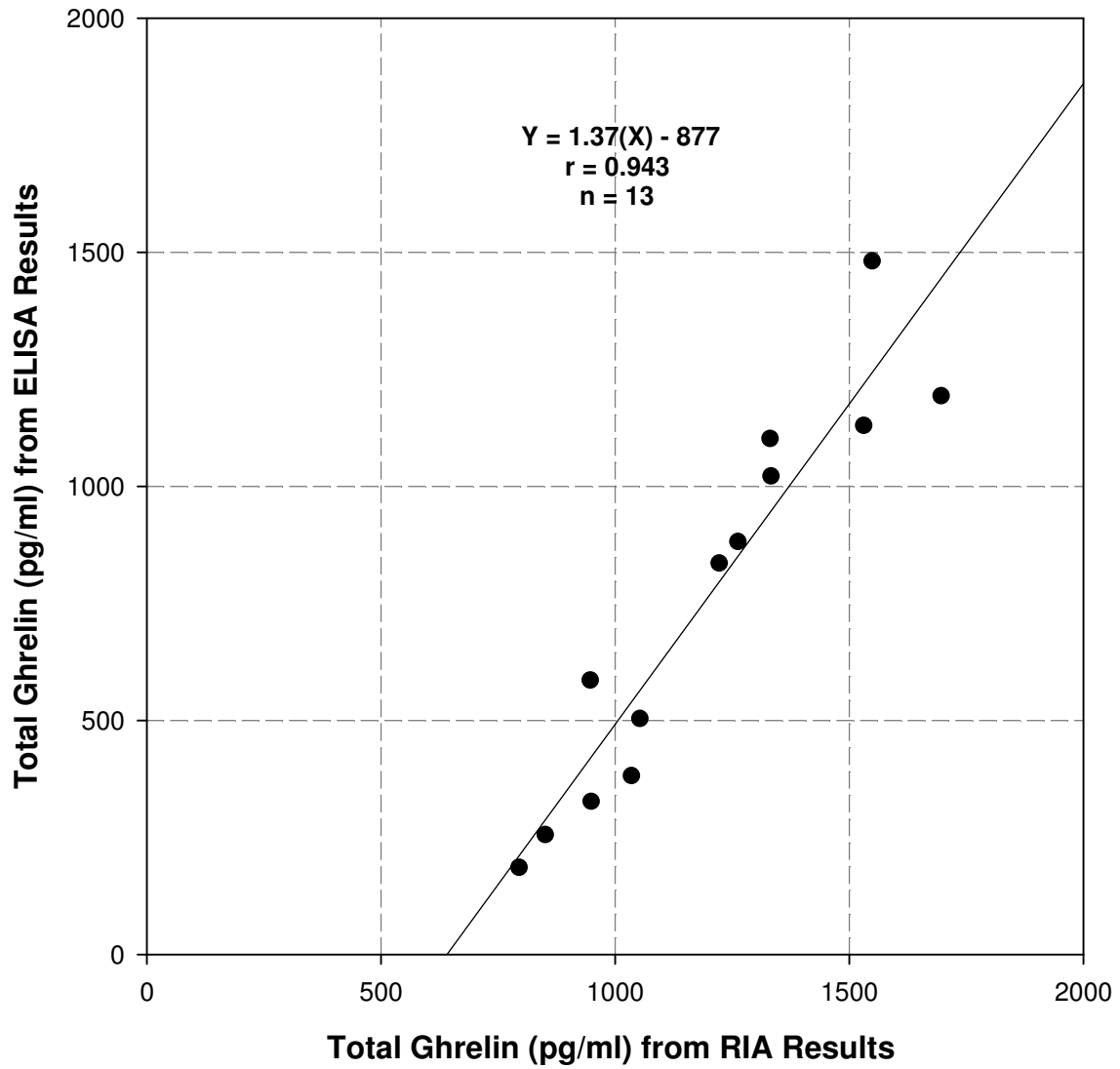


Fasting and 1-hour postprandial serum and plasma from 5 individuals were assayed for total ghrelin by ELISA.

XVII. CORRELATION GRAPH

Millipore RIA Cat. # GHRT-89HK vs ELISA Cat. # EZGRT-89K

**Total Human Ghrelin Immunoassays:
Correlation Between RIA and ELISA**



13 Fasting human serum samples collected with AEBF&HCl treatment are assayed for total ghrelin level by RIA (Linco Cat. # GHRT-89HK) and ELISA (EZGRT-89K). Paired results are analyzed by linear regression analysis.

XVIII. QUALITY CONTROLS

The ranges for Quality Control 1 and 2 are provided on the card insert or can be located at the Millipore website www.millipore.com/bmia.

XIX. TROUBLESHOOTING GUIDE

1. To obtain reliable and reproducible results the operator should carefully read this manual and fully understand all aspects of each assay step before attempting to run the assay.
2. Throughout the assay the operator should adhere strictly to the procedures with good laboratory practice.
3. Have all necessary reagents and equipment ready on hand before starting. Once the assay has been started all steps should be completed with precise timing and without interruption.
4. Avoid cross contamination of any reagents or samples to be used in the assay.
5. Make sure all reagents and samples are added to the bottom of each well.
6. Careful and complete mixing of solutions in the well is critical. Poor assay precision will result from incomplete mixing or cross well contamination due to inappropriate mixing.
7. Remove any air bubble formed in the well after acidification of substrate solution because bubbles interfere with spectrophotometric readings.
8. High absorbance in background or blank wells could be due to 1) cross well contamination by standard solution or sample or 2) inadequate washing of wells with HRP Wash Buffer or 3) overexposure to light after substrate has been added.

XX. REPLACEMENT REAGENTS

Reagents	Cat. #
Microtiter Plates	EPRAM
10X HRP Wash Buffer Concentrate (50 mL)	EWB-HRP
Human Ghrelin (Total) Standard	E8089-K
Human Ghrelin (Total) Quality Controls 1 and 2	E6089-K
Human Ghrelin (Total) Matrix Solution	EMTX-GT
Ghrelin ELISA Assay Buffer	EABGR
Human Ghrelin (Total) Capture Antibody	E1089-C
Human Ghrelin (Total) Detection Antibody	E1089-D
Enzyme Solution	EHRP
Substrate	ESS-TMB2
Stop Solution	ET-TMB

XXI. ORDERING INFORMATION

A. To place an order:

For USA Customers:

Please provide the following information to our customer service department to expedite your telephone, fax or mail order:

1. Your name, telephone and/or fax number
2. Customer account number
3. Shipping and billing address
4. Purchase order number
5. Catalog number and description of product
6. Quantity and product size

TELEPHONE ORDERS:

Toll Free US (866) 441-8400
(636) 441-8400

FAX ORDERS: (636) 441-8050

MAIL ORDERS: Millipore

6 Research Park Drive
St. Charles, Missouri 63304 U.S.A.

For International Customers:

To best serve our international customers, it is Millipore's policy to sell our products through a network of distributors. To place an order or to obtain additional information about Millipore products, please contact your local distributor.

B. Conditions of Sale

All products are for research or manufacturing use only. They are not intended for use in clinical diagnosis or for administration to human or animals. All products are intended for *in vitro* use only.

C. Material Safety Data Sheets (MSDS)

Material safety data sheets for Millipore products may be ordered by fax or phone. See Section A above for details on ordering.