Basic GDF15 Human ELISA Kit

Enzyme-linked immunosorbent assay for quantitative detection of human GDF15

Catalog Numbers ECH021 (96 tests)

Pub. No. MAN1000739 Rev. A (30)

WARNING! Read the Safety Data Sheets (SDSs) and follow the handling instructions. Wear appropriate protective eyewear, clothing, and gloves. Safety Data Sheets (SDSs) are available from thermofisher.com/support.

Product description

The Basic GDF15 Human ELISA Kit is an enzyme-linked immunosorbent assay for the quantitative detection of human GDF15. This assay is designed to detect and quantify the level of human GDF15 in serum, plasma (citrate, heparin, and EDTA), and cell culture supernatant.

Growth Differentiation Factor 15 (GDF15) is a member of the TGF-β superfamily, produced by various cell types, including macrophages, adipocytes, and endothelial cells. It is involved in regulating inflammation, apoptosis, and metabolism. GDF15 signals through the GFRAL receptor complex and is elevated in response to cellular stress and tissue injury. High levels of GDF15 are associated with cancer, cardiovascular diseases, and metabolic disorders. GDF15 plays a role in modulating energy balance and appetite regulation, making it a potential target for treating obesity and metabolic diseases. Additionally, its elevated expression in various cancers suggests its potential as a biomarker and therapeutic target in oncology.

Contents and storage

- Store kit reagents at 2–8°C.
- Immediately after use, return remaining reagents to cold storage (2–8°C).
- See the expiration date on the package.
- The kit components' expiry is guaranteed only if they are stored properly and not contaminated during repeated use.
- Do not mix components from other lots.

Components	Amount
Coated Microwell Strips	1 pouch (12 strips with 8 wells each)
Biotin-Conjugate (100X)	70 µL
Streptavidin-HRP (200X)	150 µL
Human GDF15 Standard, lyophilized (250 pg/mL upon reconstitution)	2 vials
Sample Diluent	50 mL
Assay Buffer Concentrate 20X	5 mL
Wash Buffer Concentrate 20X	50 mL
Substrate Solution (Tetramethyl-benzidine)	15 mL
Stop Solution (1M Phosphoric acid)	15 mL
Adhesive Film	4

Required materials not supplied

- Distilled or deionized water
- Microtiter plate reader with software capable of measurement at 450 nm (620 nm as optional reference wavelength)
- Beakers, flasks, and cylinders for preparation of reagents
- 5 mL and 10 mL graduated pipettes
- 5 µL to 1000 µL adjustable single channel micropipettes with disposable tips
- 50 µL to 300 µL adjustable multichannel micropipette with disposable tips
- Multichannel micropipette reservoir
- Device for delivery of wash solution (multichannel wash bottle or automatic wash system)
- Statistical calculator with program to perform regression analysis
- Microplate shaker

Before you begin

- Equilibrate the buffer concentrates to room temperature (18–25°C), then dilute before use.
- If crystals have formed in the buffer concentrates, warm gently to dissolve the crystals.

Prepare Wash Buffer (1X)

1. Transfer the entire contents (50 mL) of the Wash Buffer Concentrate (20X) to a clean 1,000-mL graduated cylinder, then add 950 mL of glass-distilled or deionized water. Mix gently to avoid foaming.
2. Transfer to a clean wash bottle, then label as 1X Wash Buffer.
3. Store Wash Buffer (1X) at 2–25°C for up to 30 days.

Prepare Assay Buffer (1X)

1. Transfer the entire contents (5 mL) of the Assay Buffer Concentrate (20X) to a clean 100-mL graduated cylinder, then add 95 mL of distilled water. Mix gently to avoid foaming.
2. Label as 1X Assay Buffer.
3. Store Assay Buffer (1X) at 2–8°C for up to 30 days.

Prepare 1X Biotin-Conjugate

Make a 1:100 dilution of the concentrated Biotin-Conjugate solution with Assay Buffer (1X) in a clean plastic tube.

IMPORTANT! Prepare Biotin-Conjugate within 30 minutes of usage.

Dilute 0.06 mL of Biotin-Conjugate (100X) with 5.94 mL of Assay Buffer (1X), then mix thoroughly.

Prepare 1X Streptavidin-HRP

Make a 1:200 dilution of the concentrated Streptavidin-HRP Conjugate in a clean plastic tube.

IMPORTANT! Prepare 1X Streptavidin-HRP within 30 minutes of usage.

Dilute 0.06 mL of concentrated Streptavidin-HRP conjugate with 11.94 mL of Assay Buffer (1X), then mix thoroughly.

Prepare Human GDF15 Standard

Prepare fresh standard on each day of use as it cannot be stored.

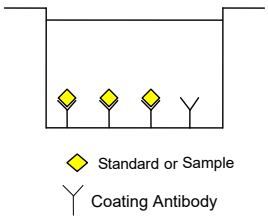
1. Reconstitute human GDF15 standard by addition of distilled water. The reconstitution volume is stated on the label.

   Note: The concentration of the reconstituted standard is 250 pg/mL.
2. Swirl or mix gently to ensure complete and homogeneous solubilization
3. Before making dilutions, allow the standard to reconstitute for 10–30 minutes, then mix well.
4. Proceed to prepare standard dilutions on a microwell plate.

Perform ELISA protocol

- Allow all components to reach room temperature before use. Mix all liquid reagents prior to use.
- Shaking is absolutely necessary for optimal test performance.

1 Bind antigen



1. Predilute the samples before starting with the test procedure. Dilute serum, plasma, and cell culture samples 1:20 with Sample Diluent according to the following scheme:
   - 10 µL of Sample + 190 µL of Sample Diluent
2. Wash the microwell strips twice with approximately 400 µL of 1X Wash Buffer per well with thorough aspiration of microwell contents between washes. Allow the Wash Buffer to sit in the wells for about 10–15 seconds before aspiration. Do not scratch the surface of the microwells.

   After the last wash step, empty wells and tap microwell strips on absorbent pad or paper towel to remove excess Wash Buffer. Use the microwell strips immediately after washing. Alternatively, microwell strips can be placed upside down on a wet absorbent paper for not longer than 15 minutes. Do not allow wells to dry.

1 *(continued)*

3. **Prepare Human GDF15 Standard dilutions on the microwell plate as follows:**
   a. Add 100 µL of Sample Diluent, in duplicate, to all standard wells.
   b. Add 100 µL of the reconstituted standard (concentration = 250 pg/mL), in duplicate, to wells A1 and A2.
   c. Mix the contents of wells A1 and A2 by repeated aspiration and ejection (concentration of standard 1, S1 = 125 pg/mL), then transfer 100 µL to wells B1 and B2, respectively. Do not scratch the inner surface of the microwells.
   d. Repeat the above procedure 5 times, creating two rows of Human GDF15 Standard dilutions ranging from 125 pg/mL to 2.0 pg/mL. Discard 100 µL of the contents from the last microwell (G1/G2=S7) used.

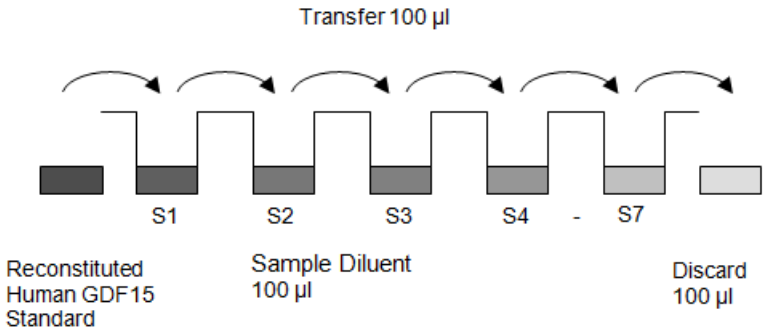


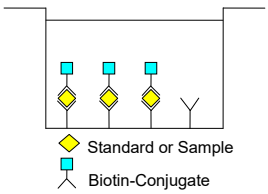
Figure 1 Standard dilutions on the microwell plate

Table 1 Example of the arrangement of blanks, standards, and samples in the microwell strips

	1	2	3	4	5	6	7	8	9	10	11	12
	Standard		Sample									
A	1	1	1	1	9	9	17	17	25	25	33	33
B	2	2	2	2	10	10	18	18	26	26	34	34
C	3	3	3	3	11	11	19	19	27	27	35	35
D	4	4	4	4	12	12	20	20	28	28	36	36
E	5	5	5	5	13	13	21	21	29	29	37	37
F	6	6	6	6	14	14	22	22	30	30	38	38
G	7	7	7	7	15	15	23	23	31	31	39	39
H	Blank	Blank	8	8	16	16	24	24	32	32	40	40

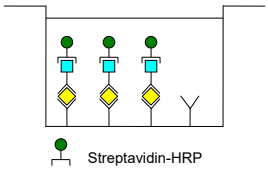
4. Add 100 µL of Sample Diluent in duplicate to the blank wells.
5. Add 50 µL of Sample Diluent in duplicate to the sample wells.
6. Add 50 µL of sample in duplicate to the sample wells.
7. Prepare 1X Biotin-Conjugate as mentioned in “Prepare 1X Biotin-Conjugate” on page 2.

2 Add 1X Biotin Conjugate



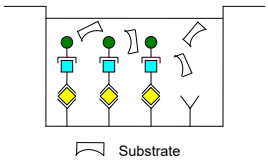
1. Add 50 µL of 1X Biotin-Conjugate to all wells.
2. Cover the plate with an adhesive film and incubate for 2 hours at room temperature on a microplate shaker set at 400 rpm.
3. Prepare 1X Streptavidin-HRP as mentioned in “Prepare 1X Streptavidin-HRP” on page 2.
4. Remove adhesive film and empty wells. Thoroughly aspirate the solution and wash wells 4 times with 1X Wash Buffer. Allow the Wash Buffer to sit in the wells for 10–15 seconds for each wash before aspiration.

3 Add 1X Streptavidin-HRP Conjugate solution



1. Add 100 µL of 1X Streptavidin-HRP Conjugate to all wells, including the blank wells.
2. Cover the plate with an adhesive film and incubate for 1 hour at room temperature on a microplate shaker set at 400 rpm.
3. Remove adhesive film and empty wells. Thoroughly aspirate the solution and wash wells 4 times with 1X Wash Buffer. Allow the Wash Buffer to sit in the wells for 10–15 seconds for each wash before aspiration.

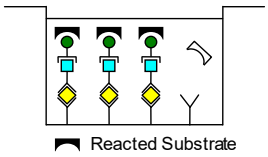
4 Add TMB Substrate Solution



1. Add 100 µL of TMB Substrate Solution to all wells.
2. Incubate the microwell strips at room temperature for about 30 minutes. Avoid direct exposure to intense light.

   Note: The color development on the plate should be monitored and the substrate reaction stopped (see next step) before positive wells are no longer properly recordable. Determination of the ideal time period for color development has to be done individually for each assay.

5 Add Stop Solution



It is recommended to add the stop solution when the highest standard develops a dark blue color.

Add 100 µL Stop Solution to each well. Tap the side of the plate to mix. The solution in the wells changes from blue to yellow.

IMPORTANT! It is important that the Stop Solution is spread quickly and uniformly throughout the microwells to completely inactivate the enzyme.

Calculation of results

Read the absorbance on a spectrophotometer using 450 nm as the primary wavelength (optionally 620 nm as the reference wavelength; 610 nm to 650 nm is acceptable as well). Blank the plate reader according to the manufacturer's instructions by using the blank wells. Determine the absorbance of both the samples and the controls.

IMPORTANT! Results must be read immediately after the Stop Solution is added or within one hour if the microwell strips are stored at 2–8°C in the dark.

Note: If instructions of this protocol have been followed, samples have been diluted 1:40 (1:20 external predilution: 10 µL of Sample + 190 µL Sample Diluent, on the plate 1:2). The concentration read from the standard curve must be multiplied by the dilution factor (×40).

A representative standard curve is shown in Figure 2.

Note: Do not use this standard curve to derive test results. Each laboratory must prepare a standard curve for each group of microwell strips assayed.

Human GDF15 was diluted in serial 2-fold steps in Sample Diluent.

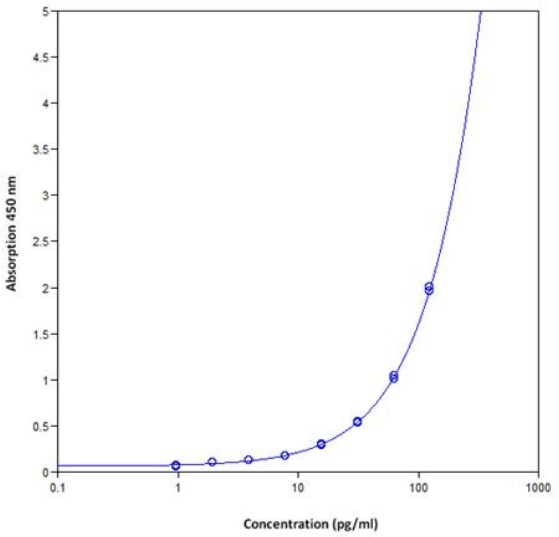


Figure 2 Representative standard curve for human GDF15 ELISA

Table 2 Typical data using the human GDF15 ELISA (measuring wavelength of 450 nm, reference wavelength of 620 nm)

Standard	Human GDF15 concentration (pg/mL)	O.D. at 450 nm	Mean O.D. at 450 nm	C.V. (%)
1	125.00	2.006 1.966	1.986	1.0
2	62.50	1.041 1.011	1.026	1.5
3	31.25	0.550 0.531	0.541	1.8
4	15.63	0.293 0.300	0.297	1.2
5	7.81	0.178 0.171	0.175	2.0
6	3.91	0.126 0.127	0.127	0.4
7	2.0	0.110 0.100	0.105	4.8
Blank	0	0.064 0.057	0.061	5.8

The OD values of the standard curve may vary according to the conditions of assay performance (for example, operator, pipetting technique, washing technique, or temperature effects).

Performance characteristics

Sensitivity

The limit of detection of human GDF15 defined as the analyte concentration resulting in an absorbance significantly higher than that of the dilution medium (mean plus 2 standard deviations) was determined to be 0.589 pg /mL (mean of 3 independent assays).

Specificity

The cross-reactivity and interference of circulating factors of the immune system were evaluated by spiking these proteins at physiologically relevant concentrations into a human GDF15 positive sample. No cross-reactivity or interference was detected.

Expected values

Panels of 40 serum samples, as well as plasma samples (EDTA, citrate, heparin), from randomly selected healthy donors (males and females) were tested for human GDF15.

Table 3

Sample matrix	Number of samples evaluated	Mean (pg/mL)	Range (pg/mL)	Standarad deviation (pg/mL)	Positive samples (%)
Serum	40	680	300–1,401	278	40
Plasma (EDTA)	40	706	355–1,951	335	40
Plasma (citrate)	40	542	197–1,194	251	40
Plasma (heparin)	40	481	275–1,011	278	40

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Revision history: Pub. No. MAN1000739 A (30)

Revision	Date	Description
A (30)	7 December 2024	New document for Basic GDF15 Human ELISA Kit.