



## **GLP1 (1-36, 7-36, 9-36) ELISA Kit**

Enzyme Immunoassay for the quantification of GLP1 (1-36, 7-36, 9-36) in human, mouse and rat serum or plasma (EDTA) samples

Catalog number: ARG81361

Package: 96 wells

For research use only. Not for use in diagnostic procedures.

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### INTRODUCTION

Glucagon plays a key role in glucose metabolism and homeostasis. Regulates blood glucose by increasing gluconeogenesis and decreasing glycolysis. A counterregulatory hormone of insulin, raises plasma glucose levels in response to insulin-induced hypoglycemia. Plays an important role in initiating and maintaining hyperglycemic conditions in diabetes.

GLP-1 is a potent stimulator of glucose-dependent insulin release. Play important roles on gastric motility and the suppression of plasma glucagon levels. May be involved in the suppression of satiety and stimulation of glucose disposal in peripheral tissues, independent of the actions of insulin. Have growth-promoting activities on intestinal epithelium. May also regulate the hypothalamic pituitary axis (HPA) via effects on LH, TSH, CRH, oxytocin, and vasopressin secretion. Increases islet mass through stimulation of islet neogenesis and pancreatic beta cell proliferation. Inhibits beta cell apoptosis.

GLP-2 stimulates intestinal growth and up-regulates villus height in the small intestine, concomitant with increased crypt cell proliferation and decreased enterocyte apoptosis. The gastrointestinal tract, from the stomach to the colon is the principal target for GLP-2 action. Plays a key role in nutrient homeostasis, enhancing nutrient assimilation through enhanced gastrointestinal function, as well as increasing nutrient disposal. Stimulates intestinal glucose transport and decreases mucosal permeability.

Oxyntomodulin significantly reduces food intake. Inhibits gastric emptying in humans. Suppression of gastric emptying may lead to increased gastric distension, which may contribute to satiety by causing a sensation of fullness.

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Glicentin may modulate gastric acid secretion and the gastro-pyloro-duodenal activity. May play an important role in intestinal mucosal growth in the early period of life. [UniProt]

### PRINCIPLE OF THE ASSAY

This is an Enzyme Immunoassay for the quantification GLP1 (1-36, 7-36, 9-36) in human, mouse and rat serum and EDTA-plasma samples. This assay employs the competitive quantitative enzyme immunoassay technique. A secondary antibody has been pre-coated onto a microtiter plate. The secondary antibody can bind to the Fc fragment of the primary antibody which recognizes GLP1 (1-36, 7-36, 9-36). The primary antibodies in the kit will be competitively bound by both biotinylated GLP1 (7-36) peptides and GLP1 (7-36) peptides in standards or targeted GLP1 (1-36, 7-36, 9-36) peptides in samples. The wells are washed and then incubated with Streptavidin-HRP reagent. The biotinylated peptide interacts with streptavidin-horseradish peroxidase to form a complex. After washing away any unbound Streptavidin-HRP reagent, a substrate solution (TMB) is added to the wells and color develops in inverse-proportion to the amount of GLP1 (1-36, 7-36, 9-36) present in the samples. The color development is stopped by the addition of STOP solution and the intensity of the color is measured at a wavelength of  $450\text{nm} \pm 2 \text{ nm}$ . The concentration of GLP1 (1-36, 7-36, 9-36) in the sample is then determined by comparing the O.D of samples to the standard curve.

## **MATERIALS PROVIDED & STORAGE INFORMATION**

Store the unopened kit at 2-8 °C. Use the kit before expiration date.

<b>Component</b>	<b>Quantity</b>	<b>Storage information</b>
Secondary antibody coated microplate	12 x 8 wells	4°C
20X Wash Buffer	50 ml	4°C
Primary antibody	1 vial	4°C
Biotinylated peptide	1 vial	4°C
Standard	1 vial	4°C
1000X Streptavidin-HRP conjugate	30 µl	4°C
TMB substrate	12 ml (Ready-to-use)	4°C (Protect from light)
STOP solution (2N HCl)	15 ml (Ready-to-use)	4°C
Positive Controls (Accept. Range: 0.2-0.5 ng/ml)	2 vial	4°C
Plate sealer	3 pieces	Room Temperature

## **MATERIALS REQUIRED BUT NOT PROVIDED**

- Microplate reader capable of measuring absorbance at 450nm
- Pipettes and pipette tips
- Deionized or distilled water
- Microplate shaker (300-400rpm)
- Automated microplate washer (optional)

## **TECHNICAL HINTS AND PRECAUTIONS**

- Wear protective gloves, clothing, eye, and face protection especially while handling blood or body fluid samples.
- Store the kit at 4°C at all times.
- Before opening any Eppendorf tubes for reconstitution, briefly centrifuge at ~3,000rpm for 5 seconds to ensure that all the lyophilized material is at the bottom of the tube.
- If crystals are observed in the 20X Wash buffer, warm to RT or 37°C until the crystals are completely dissolved.
- Ensure complete reconstitution and dilution of reagents prior to use.
- It is highly recommended that all solutions be used as soon as possible after reconstitution.
- Unused microplate strips should be placed back in the foil pouch with a desiccant and stored at 4°C. Do not allow moisture to enter the wells.
- All reagents should be mixed by gentle inversion or swirling prior to use. Do not induce foaming.
- Before using the kit, spin tubes and bring down all components to the bottom of tubes.
- Each time a new tip is used, make sure the tip is secure and free of air bubbles. For better intra-assay variation, aspirate and expel a reagent or sample back into the container a few times prior to loading.
- Avoid submerging the whole tip into reagents because droplets can accumulate at the end of the tip causing an excess of reagent to be loaded into the well. This can lead to poor results.
- For optimal results, an orbital plate shaker capable of 300-400 rpm is recommended for all incubations.

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- It is highly recommended that the standards, samples and controls be assayed in duplicates.

### SAMPLE COLLECTION & STORAGE INFORMATION

The sample collection and storage conditions listed below are intended as general guidelines. Sample stability has not been evaluated.

**Serum**- Use a serum separator tube (SST) and allow samples to clot for 30 minutes before centrifugation for 15 minutes at 1600 x g at 4°C. Collect serum and assay immediately or aliquot and store samples at  $\leq -80$  °C up to 1 month. Avoid repeated freeze-thaw cycles.

**Plasma** - Collect plasma using EDTA as an anticoagulant. Centrifuge for 15 minutes at 4°C at 1000 x g within 30 minutes of collection. Assay immediately or aliquot and store samples at  $\leq -80$  °C up to 1 month. Avoid repeated freeze-thaw cycles.

**Note:** We recommended add Aprotinin (enzyme inhibitor) for **ALL** sample collection to prevent sample degradation. 0.6 TIU or 100  $\mu$ l of Aprotinin per mL of sample solution.

#### Peptide extraction –

1. It is recommended through peptide extraction protocol.
2. Mix an equal amount of Binding Buffer (1% trifluoroacetic acid (TFA), HPLC grade is recommended) with the plasma or serum samples and vortex the mixture. (E.g. 1ml of plasma/serum + 1 ml of Binding Buffer). Centrifuge at 6,000-17,000 x g for 20 minutes at 4°C. Collect the supernatant.
3. Slowly equilibrate a C18 column (SEP- or SPE-COLUMN containing 200 mg of C18) by washing the C18 column with 1 ml Elution Buffer (60%

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acetonitrile, 1% TFA, and 39% distilled water, HPLC grade of acetonitrile and TFA are recommended).

4. Wash the C18 column with 3 ml of Binding Buffer three times.
5. Load the sample/Binding Buffer mixture solution from step 2 into the washed C18 column from step 4.
6. Wash the column slowly with Binding Buffer (3 ml, twice) and discard the wash.
7. Elute the peptide slowly with Elution Buffer (3 ml, once) and collect eluant into a polystyrene tube.

Note: From steps 5-7, no pressure should be applied to the column.

8. Evaporate eluant to dryness in a centrifugal concentrator or by a suitable substitute method to dryness the eluant. (Freeze-dry the resulting water/TFA solution to dryness)
9. Keep the dried extract at -20°C and perform the assay as soon as possible.
10. Use 1x Wash buffer to reconstitute the dried extract. If the peptide value does not fall within the range of detection, dilute or concentrate the sample accordingly.

Note: For normal subject extracted from 1 ml original plasma/serum, use 125 µl 1x Wash buffer to reconstitute the dried extract. Aliquot 50 µl into two designated assay wells (25 µl is left over). The concentration factor in this case is 8. ( $1 \text{ ml} / 125 \text{ ul} = 8$ ). The original plasma peptide concentration level is 1/8 of the level of final extracted plasma.

e.g. If the level of the final extracted plasma is 100 pg/ml, then the total level of peptide in the original plasma =  $(100 \text{ pg/ml}) / 8 = 12.5 \text{ pg/ml}$ . After performing assay, if the peptide value exceeds or does not fall in the range of detection, dilute or concentrate the samples accordingly.



### Drying Sample After Extraction:

A combination of a centrifugal concentrator (i.e. Speedvac) and a lyophilizer (freeze-dryer) produces the best results for drying the sample after extraction. First, use a Speedvac to dry sample for approximately 15 minutes to remove the organic layer. Then snap-freeze the remaining sample, and freeze-dry overnight using a lyophilizer. This two-step procedure produces a more consistent fluffy powder that is easier to rehydrate than a sample dried only with a centrifugal concentrator. However, if a centrifugal concentrator is not accessible, freeze-drying overnight using a lyophilizer will be sufficient.

### REAGENT PREPARATION

- **1X Wash Buffer:** Dilute **20X** Wash Buffer into distilled water to yield 1X Wash buffer. Store the diluted 1X Wash Buffer at 4°C. If crystals appear in 20X Wash Buffer, warm the buffer in warm water bath (not higher than 50°C) for 30 minutes or until crystals disappear. Mix well before use.
- **Primary antibody:** Reconstitute the Primary antibody vial with **5 ml** of 1X Wash Buffer. Allow it to sit for 5 minutes to completely dissolve, mix well and keep rehydrated solution at 4°C before use. Store the reconstituted antibody at 4°C up to a week. For long-term storage, aliquot & store at -20°C for up to 3 months. Avoid repeated freeze-thaw cycles. It is recommended that antibody should only be frozen-thawed once.
- **Biotinylated peptide:** Reconstitute the Biotinylated peptide vial with **5 ml** of 1X Wash Buffer. Allow it to sit for 5 minutes to completely dissolve, mix well and keep rehydrated solution at 4°C before use. Store the

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reconstituted peptide at 4°C up to a week. For long-term storage, aliquot & store at -20°C for up to 3 months. Avoid repeated freeze-thaw cycles. It is recommended that peptide should only be frozen-thawed once.

- **Positive control:** Centrifuge and reconstitute the Positive control vial with **200 µl** of 1X Wash Buffer. Allow it to sit for 5 minutes to completely dissolve, mix well and keep rehydrated solution at 4°C before use. Store the reconstituted control at 4°C up to a week. For long-term storage, aliquot & store at -20°C for up to 3 months. Avoid repeated freeze-thaw cycles. It is recommended that control should only be frozen-thawed once. (acceptable range dependent on lot#)
- **1X Streptavidin-HRP conjugate:** 1X Streptavidin-HRP conjugate working solution should be prepared freshly before use. Centrifuge 1000X Streptavidin-HRP conjugate briefly and add **12µl** of Streptavidin-HRP to **12ml** 1X wash buffer to make a 1X Streptavidin-HRP working solution. Vortex thoroughly.
- **Standard peptide:** Centrifuge and reconstitute the standard with **1 ml** of 1X Wash buffer and vortex. The concentration of this stock solution is 1000 ng/ml. Allow the solution to sit for at least 10 minutes at room temperature to completely dissolve. Store the reconstituted standard at 4°C up to a week. For long-term storage, aliquot & store at -20°C for up to 3 months. Avoid repeated freeze-thaw cycles. It is recommended that standard should only be frozen-thawed once. Dilute peptide standard solutions with 1X Wash buffer to **100 ng/ml, 10 ng/ml, 1 ng/ml, 0.1 ng/ml, 0.01 ng/ml** as follows:

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The example of the dilution of standards

Standard No.	Standard Conc. (ng/ml)	1X Wash Buffer (μl)	Standard (μl)
Stock	1000	-	-
S1	100	900	100 μl of Stock
S2	10	900	100 μl of S1
S3	1	900	100 μl of S2
S4	0.1	900	100 μl of S3
S5	0.01	900	100 μl of S4
S0 (Total binding)	0	900	0

### ASSAY PROCEDURE

All materials should be equilibrated to room temperature (RT, 20-23°C) 30 minutes before use. Standards, samples and blank should be assayed in duplicates.

1. Remove excess microtiter strips from the plate frame, return them to the foil pouch containing the desiccant pack, and reseal it.
2. Add **50 μl of 1X Wash Buffer** as Total Binding (S0, zero standard). Two empty wells should be left as blank.
3. Add **50 μl of prediluted peptide standards** (add from S5 to S1), **50 μl positive controls** or **50 μl samples** into corresponding wells. It is advisable to assay each condition in duplicates.
4. Add **25 μl of primary antibody** into each well **except the Blank wells**.
5. Add **25 μl of Biotinylated peptide** into each well **except the Blank wells**. It is not recommended to use a multi-channel pipette to load the primary antibody and biotinylated peptide.
6. Seal the microtiter plate with plate sealer. Incubate for **2 hours at RT**.

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Orbital shaking at 300-400 rpm is recommended.

- Mix and centrifuge Streptavidin-HRP concentrate vial (3,000-5,000 rpm for 5 seconds) before use. Pipette 12  $\mu$ l of Streptavidin-HRP concentrate into 12 ml of 1X Wash Buffer to make Streptavidin-HRP working solution. Vortex thoroughly. Prepare freshly.
- Remove sealer from plate.
- Aspirate each well and wash, repeating the process 4 times for a **total 5 washes**. Wash by filling each well with **1 $\times$  Wash Buffer (350  $\mu$ l)** using a squirt bottle, manifold dispenser, or autowasher. Complete removal of liquid at each is essential to good performance. After the last wash, remove any remaining Wash Buffer by aspirating, decanting or blotting against clean paper towels.
- Add **100  $\mu$ l of diluted (1X) Streptavidin-HRP** working solution into **each well**.
- Reseal the plate with sealer. Incubate for **1 hour at RT**. Orbital shaking at 300-400 rpm is recommended.
- Remove sealer from plate. **Wash** as according to step 9.
- Add **100  $\mu$ l of TMB substrate** solution into **each well**.
- Reseal the plate with sealer. Incubate for **1 hour at RT in dark** Orbital shaking at 300-400 rpm is recommended.
- Remove sealer from plate. (**DO NOT** wash or discard the contents of the wells)
- Add **100  $\mu$ l of STOP solution (2N HCl)** into **each wells** to stop the reaction. Gently tap the plate to ensure thorough mixing. The color of the solution should change from blue to yellow.
- Read the OD with a microplate reader at **450 nm** immediately. It is

recommended that the wells be read within 20 minutes after adding the Stop Solution.

## **CALCULATION OF RESULTS**

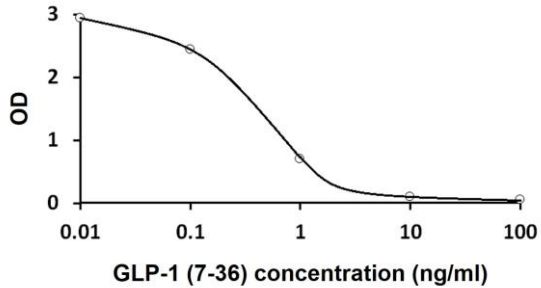
1. Calculate the average absorbance values for each set of standards, controls and patient samples.
2. Using log-log, semi-log or linear graph paper, construct a standard curve by plotting the mean absorbance obtained from each standard against its concentration with absorbance value on the vertical (Y) axis and concentration on the horizontal (X) axis.
3. Using the mean absorbance value for each sample determine the corresponding concentration from the standard curve.
4. Automated method: The results in the IFU have been calculated automatically using a 4 PL (4 Parameter Logistics) curve fit. 4 Parameter Logistics is the preferred method. Other data reduction functions may give slightly different results.
5. arigo provides GainData<sup>®</sup>, an in-house development ELISA data calculator, for ELISA data result analysis. Please refer our GainData<sup>®</sup> website for details. (<https://www.arigobio.com/elisa-analysis>)
6. If samples have been diluted prior to the assay, the measured concentration must be multiplied by their respective dilution factors.

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### EXAMPLE OF TYPICAL STANDARD CURVE

The following data is for demonstration only and cannot be used in place of data generations at the time of assay.



### QUALITY ASSURANCE

#### Sensitivity

The standard of GLP1 (1-36, 7-36, 9-36) ranged from 0-100 ng/ml.

The mean MDD was 0.16 ng/ml.

#### Linear Range

0.16- 1.77 ng/ml

#### Precision:

Intra-assay: < 10%

Inter-assay: < 15%

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### Cross Reactivity

The cross reactivity ratio of the tested peptide as the table:

Peptide	Cross Reactivity (%)
GLP-1 (7-36) (Human, Mouse, Rat)	100
GLP-1 (9-36) Amide (Human, Mouse, Rat)	100
GLP-1 (1-36) Amide (Human)	100
GLP-1 (7-37) (Human, Rat, Mouse)	0.4
GLP-2 (Human)	0
Glucagon (Human, Rat, Mouse, Porcine, Bovine)	0
CGRP	0
GIP	0
VIP	0
Insulin	0
Exendin-4	0