ab327808 – Human Insulin SimpleStep ELISA® Kit, Chemiluminescent

For the quantitative measurement of Insulin in human serum, plasma (heparin) and plasma (EDTA) samples.
For research use only - not intended for diagnostic use.
Patent pending.

For overview, typical data and additional information please visit: www.abcam.com/ab327808

Storage and Stability: Store kit at 2-8°C immediately upon receipt. Refer to list of materials supplied for storage conditions of individual components. Observe the storage conditions for individual prepared components in the Standard Preparation and Reagent preparation sections.

Limitations: All data, except typical standard curve and sensitivity were collected using the colorimetric version of this kit (ab278123).

Materials Supplied

Item	Quantity 1 x 96 tests	Quantity 10 x 96 tests	Storage Condition
Human Insulin Capture Antibody 10X	600 µL	10 x 600 µL	+4°C
Human Insulin Detector Antibody 10X	600 µL	10 x 600 µL	+4°C
Human Insulin Lyophilized Recombinant Protein	2 Vials	10 x 2 Vials	+4°C
Antibody Diluent CPI2	6 mL	10 x 6 mL	+4°C
Sample Diluent NS	12 mL	2 x 50 mL	+4°C
Wash Buffer PT 10X	20 mL	200 mL	+4°C
ChemiHRP Reagent A	3 mL	50 mL	+4°C
ChemiHRP Reagent B	3 mL	50 mL	+4°C
SimpleStep Pre-Coated Black 96-Well Microplate	1 x 96 Wells	10 x 96 Wells	+4°C
Plate Seal	1	10	+4°C

Materials Required, Not Supplied

These materials are not included in the kit, but will be required to successfully utilize this assay:

Luminometer capable of reading strip plates with the following settings: 0.5-1 second/well read time; summation mode (all wavelengths).
Deionized water.
Multi- and single-channel pipettes.
Tubes for standard dilution.
Orbital microplate shaker for all incubation steps: capable of 750 rpm shaking speed.
Optional: Phenylmethylsulfonyl Fluoride (PMSF) (or other protease inhibitors).

Reagent Preparation

Equilibrate all reagents to room temperature (18-25°C) prior to use. The kit contains enough reagents for 96 wells. The sample volumes below are sufficient for 48 wells (6 x 8-well strips); adjust volumes as needed for the number of strips in your experiment.

Prepare only as much reagent as is needed on the day of the experiment. Capture and Detector Antibodies have only been tested for stability in the provided 10X formulations.

1X Wash Buffer PT: Prepare 1X Wash Buffer PT by diluting Wash Buffer PT 10X with deionized water. To make 50 mL 1X Wash Buffer PT combine 5 mL Wash Buffer PT 10X with 45 mL deionized water. Mix thoroughly and gently.

Antibody Cocktail: Prepare Antibody Cocktail by diluting the capture and detector antibodies in Antibody Diluent CPI2. To make 3 mL of the Antibody Cocktail combine 300 µL 10X Capture Antibody and 300 µL 10X Detector Antibody with 2.4 mL Antibody Diluent CPI2. Mix thoroughly and gently.

Lumi HRP Development Solution: Just prior to use, prepare Lumi HRP Development Solution by mixing equal volume of the ChemiHRP Reagent A and the ChemiHRP Reagent B. To make 3 mL of the Lumi HRP Development Solution combine 1.5 mL of ChemiHRP Reagent A and 1.5 mL of ChemiHRP Reagent B. Mix thoroughly and gently by inversion or slow pipetting (Avoid shaking or vortexing). Protect the prepared solution from light until use.

Standard Preparation

Always prepare a fresh set of standards for every use. Discard working standard dilutions after use as they do not store well. The following section describes the preparation of a standard curve for duplicate measurements (recommended).

1. Reconstitute the Insulin standard sample by adding the volume of Sample Diluent NS indicated on the protein vial label. Hold at room temperature for 10 minutes. Mix thoroughly and gently. This is the 8,600 pmol/L **Stock Standard** Solution (equivalent to 50 ng/mL*).
2. Label seven tubes, Standards 1–7.
3. Add 385 µL of Sample Diluent NS into tube number 1 and 150 µL of Sample Diluent NS into numbers 2-7.
4. Use the **Stock Standard** to prepare the following dilution series. Standard #7 contains no protein and is the Blank control:

Standard #	Dilution Sample	Volume to Dilute (µL)	Volume of Diluent (µL)	Starting Conc. (pmol/L)	Final Conc. (pmol/L)
1	**Stock Standard**	45	385	8,600	900
2	Standard#1	75	150	900	300
3	Standard#2	75	150	300	100
4	Standard#3	75	150	100	33.3
5	Standard#4	75	150	33.3	11.1
6	Standard#5	75	150	11.1	3.7
7	Blank Control	0	150	0	0

**A molecular weight of 5807.67 Da was used to convert Insulin from picograms to picomoles. The conversion factor of 0.172 was used to convert values from pg/mL to pmol/L.*

Sample Preparation

Typical Sample Dynamic Range	
Sample Type	**Range**
Serum	47.50 - 95%
Plasma – EDTA	11.88 - 95%
Plasma – Heparin*	≤ 50%

*Based on spiked sample.

Serum Samples should be collected into a serum separator tube. After clot formation, centrifuge samples at 2,000 x g for 10 minutes and collect serum. Dilute samples at least 95% into Sample Diluent NS and assay. Store un-diluted serum at -20°C or below. Avoid repeated freeze-thaw cycles.
Plasma Collect plasma using EDTA or heparin. Centrifuge samples at 2,000 x g for 10 minutes. Dilute plasma (EDTA) samples at least 95% into Sample Diluent NS and assay. Dilute plasma (heparin) samples at least 50% into Sample Diluent NS and assay. Store un-diluted plasma samples at -20°C or below for up to 3 months. Avoid repeated freeze-thaw cycles. Note: This kit is incompatible with plasma (citrate) samples.

Plate Preparation

The 96 well plate strips included with this kit are supplied ready to use. It is not necessary to rinse the plate prior to adding reagents.
Unused plate strips should be immediately returned to the foil pouch containing the desiccant pack, resealed and stored at 4°C.
For each assay performed, a minimum of two wells must be used as the zero control.
For statistical reasons, we recommend each sample should be assayed with a minimum of two replicates (duplicates).
Differences in well absorbance or "edge effects" have not been observed with this assay.

Assay Procedure

Equilibrate all materials and prepared reagents to room temperature prior to use.
We recommend that you assay all standards, controls and samples in duplicate.

1. Prepare all reagents, working standards, and samples as directed in the previous sections.
2. Remove excess microplate strips from the plate frame, return them to the foil pouch containing the desiccant pack, reseal and return to 4°C storage.
3. Add 50 µL of all sample or standard to appropriate wells.
4. Add 50 µL of the Antibody Cocktail to each well.
5. Seal the plate and incubate for 30 minutes at room temperature on a plate shaker set to 750 rpm.
6. Wash each well with 3 x 350 µL 1X Wash Buffer PT. Wash by aspirating or decanting from wells then dispensing 350 µL 1X Wash Buffer PT into each well. Wash Buffer PT should remain in wells for at least 30 seconds. Complete removal of liquid at each step is essential for good performance. After the last wash invert the plate and tap gently against clean paper towels to remove excess liquid.
7. Add 50 µL of prepared Lumi HRP Development Solution to each well and incubate for 1 minute in the dark on a plate shaker set to 750 rpm. Further optimization of incubation time vs signal strength can be performed if needed. Avoid introducing bubbles into the wells.
8. Measure the produced light of each well using a microplate luminometer with the following settings: 0.5-1 second/well read time in summation mode (all wavelengths). Relative light unit (RLU) readings may vary between luminometer models. It is recommended to configure instrument settings according to the manufacturer's specifications. Note: Relative light unit (RLU) values may change over the course of the 15-minute reading window.
9. Analyze the data as described below.

Mode:	Luminescence
Instrument settings:	Endpoint
Detection Mode:	All wavelengths
Read Time:	0.5-1 sec
Read:	Top

Note For microplate readers with Pre-Read Optimization option, the Read Height as well as Microplate Optimization is recommended before the first read.

Download our ELISA guide for technical hints, results, calculation, and troubleshooting tips:
https://www.abcam.com/en-us/technical-resources/guides/elisa-guide

Technical Support
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Additional information

ASSAY SPECIFICITY
This kit is designed for the quantification of human Insulin.

The standard protein in this kit is mature full length human Insulin (chain A and chain B).

Native signal was detected in serum, plasma (EDTA) and plasma (heparin) sample types.

Spiked protein experiments were used to validate serum and plasma (heparin) sample types.

Cell culture supernatant, urine, saliva, milk, CSF, cell extract, and tissue extract samples have not been tested with this kit.

This kit is incompatible with plasma (citrate) samples.

CROSS REACTIVITY
Recombinant human Proinsulin and C-peptide were each prepared at 50 ng/mL and 2.9 ng/mL and assayed for cross reactivity. No cross reactivity was observed.

INTERFERENCE
Recombinant human Proinsulin and C-peptide were each prepared at 50 ng/mL and 2.9 ng/mL and tested for interference. No interference was observed.

SPECIES REACTIVITY
Other species reactivity was determined by measuring 95% serum samples of various species, interpolating the protein concentrations from the human standard curve, and expressing the interpolated concentrations as a percentage of the protein concentration in human serum assayed at the same dilution.

95% Rhesus macaque serum interpolated as 114.77 pmol/L on the human curve.

Reactivity <3% was determined for the following species: Mouse, Rat, Cow.

Other species reactivity not determined.

CALIBRATION
This immunoassay is calibrated against a highly purified human Insulin. The NIBSC/WHO unclassified purified human Insulin preparation 83/500 was evaluated in this kit.

The dose response curve of the unclassified standard Insulin parallels the SimpleStep standard curve. To convert sample values obtained with the SimpleStep Human Insulin kit to approximate NIBSC 83/500 units, use the equation below.

NIBSC (83/500) approximate value (pmol/L) = 0.811 x SimpleStep Human Insulin value (pmol/L)

A molecular weight of 5807.67 Da was used to convert Insulin from picograms to picomoles. The conversion factor of 0.172 was used to convert values from pg/mL to pmol/L.

CALCULATION
- Preconfigured protocols are available when using SoftMax Pro software from Molecular Devices.
- Calculate the average chemiluminescence value for the blank control (zero) standards. Subtract the average blank control standard chemiluminescence value from all other chemiluminescence values.
- Create a standard curve by plotting the average blank control subtracted chemiluminescence value for each standard concentration (y-axis) against the target protein concentration (x-axis) of the standard. Use graphing software to draw the best smooth curve through these points to construct the standard curve.
- Note: Most chemiluminescence reader software or graphing software will plot these values and fit a curve to the data. A four-parameter curve fit (4PL) is often the best choice; however, other algorithms (e.g. linear, semi-log, log/log, 4-parameter logistic) can also be tested to determine if it provides a better curve fit to the standard values.
- Determine the concentration of the target protein in the sample by interpolating the blank control subtracted chemiluminescence values against the standard curve. Multiply the resulting value by the appropriate sample dilution factor, if used, to obtain the concentration of target protein in the sample.
- Samples generating chemiluminescence values greater than that of the highest standard should be further diluted and reanalyzed. Similarly, samples which measure at chemiluminescence values less than that of the lowest standard should be retested in a less dilute form.

TYPICAL DATA

Typical standard curve – data provided for demonstration purposes only. A new standard curve must be generated for each assay performed.

Standard Curve Measurements			
Concentration (pmol/L)	RLU		Mean RLU
	1	2	
0	267	241	254
3.7	601	561	581
11.1	2,397	2,256	2,327
33.3	20,708	20,084	20,396
100	181,651	176,591	179,121
300	1,356,106	1,340,330	1,348,218
900	7,242,329	7,264,327	7,253,328

Table 1. Example of human Insulin standard curve in Sample Diluent NS. The Insulin standard curve was prepared as described in the Standard Preparation section. The table shows raw data values.

TYPICAL SAMPLE VALUES

Sensitivity:

The calculated minimal detectable dose (MDD) is 0.89 pmol/L. The MDD was determined by calculating the mean of zero standard replicates (n=16) and adding 2 standard deviations then extrapolating the corresponding concentration.

Recovery

Three concentrations of Insulin were spiked in duplicate to the indicated biological matrix to evaluate signal recovery in the working range of the assay.

Sample Type	Average % Recovery	Range (%)
Serum (95%)	96	94 – 98
Plasma – EDTA (95%)	99	95 – 103
Plasma – Heparin (50%)	89	80 – 97

Linearity of Dilution

Linearity of dilution is determined based on interpolated values from the standard curve. Linearity of dilution defines a sample concentration interval in which interpolated target concentrations are directly proportional to sample dilution.

Native Insulin was measured in the following biological samples in a 2-fold dilution series. Sample dilutions are made in Sample Diluent NS.

Dilution Factor	Interpolated value	95% Human Serum	95% Human Plasma (EDTA)
Undiluted	pmol/L	89	203
	% Expected value	100	100
2	pmol/L	46	109
	% Expected value	102	108
4	pmol/L	NL	57
	% Expected value	NL	112
8	pmol/L	NL	28
	% Expected value	NL	109

NL – Non-Linear

50% pooled plasma (heparin) samples from healthy donors were measured in duplicate and corrected for sample dilution. The mean Insulin concentration was determined to be 71.55 pmol/L in plasma (heparin).

Recombinant Insulin was spiked into the following biological samples and then diluted in a 2-fold dilution series. Sample dilutions are made in Sample Diluent NS.

Dilution Factor	Interpolated value	95% Human Serum	50% Human Plasma (Heparin)
Undiluted	pmol/L	357	371
	% Expected value	100	100
2	pmol/L	180	175
	% Expected value	101	94
4	pmol/L	92	94
	% Expected value	103	102
8	pmol/L	46	54
	% Expected value	103	117
16	pmol/L	NL	27
	% Expected value	NL	116

NL – Non-Linear

Precision

Mean coefficient of variations of interpolated values of Insulin from two concentrations of human serum within the working range of the assay.

	Intra-assay	Inter-assay
n=	8	3
CV (%)	9.4	11.8

Download our ELISA guide for technical hints, results, calculation, and troubleshooting tips:
https://www.abcam.com/en-us/technical-resources/guides/elisa-guide

Technical Support

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