Mercodia

Mercodia C-peptide ELISA

Directions for Use

REF 10-1136-03
Reagents for 96 determinations

For Research Use Only
Not for Use in Diagnostic Procedures

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31-3209
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Explanation of symbols used on labels

	Reagents for 96 determinations
	Use-by date
	Temperature limit
	Batch code
	Catalogue number
	Consult electronic Instructions for Use
	Manufacturer

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Intended Use

Mercodia C-peptide ELISA provides a method for the quantitative determination of human C-peptide in serum, plasma or urine.

Summary and explanation of the test

Qualitative and quantitative evaluation of pancreatic beta-cell function is not only of use in the pre- and post-diagnostic study of the natural history of diabetes mellitus, but is also relevant in clinical practice as a guide to the correct choice of treatment. Peripheral insulin levels cannot be used to assess beta-cell function because of a large and variable uptake from the portal circulation into the liver, and because insulin assays cannot distinguish endogenous from exogenous insulin.

Within the pancreatic beta-cell, proinsulin is cleaved into one molecule of C-peptide and one molecule of insulin. C-peptide is subsequently released into the circulation at concentrations equimolar to those of insulin. In contrast to insulin, C-peptide is only minimally extracted by the liver. Peripheral C-peptide concentrations therefore reflect the secretion of beta-cells more accurately than insulin.

Urinary C-peptide excretion is correlated with integrated plasma C-peptide levels but the extraction is highly variable between and within individuals and is, therefore, an imprecise measure of beta-cell function.

Principle of the procedure

Mercodia C-peptide ELISA is a solid phase two-site enzyme immunoassay. It is based on the direct sandwich technique in which two monoclonal antibodies are directed against separate antigenic determinants on the C-peptide molecule. During incubation, C-peptide in the sample reacts with anti-C-peptide antibodies bound to the microtitration well. After washing, peroxidase conjugated anti-C-peptide antibodies are added. After a second incubation and a simple washing step, the bound conjugate is detected by reaction with 3,3',5,5'-tetramethylbenzidine (TMB). The reaction is stopped by adding acid to give a colorimetric endpoint that is read spectrophotometrically.

Warnings and precautions

- All samples should be handled as of capable of transmitting infections.
- Each well can only be used once.
- Do not mix components from different lots.
- Dispose of used components according to local regulations for biohazardous waste.

For safety information, please consult the safety data sheets (SDS) available at our website https://www.mercodia.com/technical-library/.

Material required but not provided

- Pipettes with appropriate volumes (repeating pipettes preferred for addition of enzyme conjugate 1X solution, Assay Buffer, Substrate TMB and Stop Solution)
- Tubes, beakers and cylinders for reagent preparation
- Redistilled water
- Magnetic stirrer
- Vortex mixer
- Microplate reader with 450 nm filter
- Microplate shaker (700–900 cycles per minute, orbital movement)
- Microplate washing device with overflow function (recommended but not required)

Reagents

Each Mercodia C-peptide ELISA kit (10-1136-03) contains reagents for 96 wells, sufficient for 42 samples and one calibrator curve in duplicate. For larger series of assays, use pooled reagents from packages bearing identical lot numbers. The expiry date for the complete kit is stated on the outer label. The recommended storage temperature is 2–8°C.

Coated Plate Mouse monoclonal anti-C-peptide	1 plate	96 wells 8-well strips	Ready for use
For unused microplate strips, reseal the bag using adhesive tape, store at 2–8°C and use within 2 months.			
Calibrators 1, 2, 3, 4, 5 Color coded yellow Concentration stated on vial label Storage after reconstitution: 2–8°C for 1 week	5 vials	1000 µL	Lyophilized Add 1000 µL redistilled water per vial
For storage of reconstituted Calibrators for more than one week, aliquote and store at -20°C. The aliquoted calibrators are stable for 6 weeks at -20°C. Avoid repeated freezing and thawing.			
Calibrator 0 Color coded yellow *Note! Negative control!*	1 vial	5 mL	Ready for use
Assay Buffer Color coded red	1 vial	6 mL	Ready for use
Enzyme Conjugate 11X Peroxidase conjugated mouse monoclonal anti-C-peptide	1 vial	1.2 mL	Preparation, see below
Enzyme Conjugate Buffer Color coded blue	1 vial	12 mL	Ready for use
Wash Buffer 21X Storage after dilution: 2-8°C for 2 months	1 bottle	50 mL	Dilute with 1000 mL redistilled water to make wash buffer 1X solution.
Substrate TMB Colorless solution *Note! Light sensitive!*	1 bottle	22 mL	Ready for use
Stop Solution 0.5 M H_2SO_4	1 vial	7 mL	Ready for use

Preparation of enzyme conjugate 1X solution

Prepare the needed volume of enzyme conjugate 1X solution by dilution of Enzyme Conjugate 11X, (1+10) in Enzyme Conjugate Buffer or according to the table below. When preparing enzyme conjugate 1X solution for the whole plate, pour all of the Enzyme Conjugate Buffer into the Enzyme Conjugate 11X vial. Mix gently.

Number of strips	Enzyme Conjugate 11X	Enzyme Conjugate Buffer
12 strips	1 vial	1 vial
8 strips	700 µL	7 mL
4 strips	350 µL	3.5 mL

Storage after dilution: 2-8°C, use within 1 week.

Specimen collection and handling

Serum

Collect blood by venipuncture, allow to clot, and separate the serum by centrifugation. Serum samples should be stored at 2–8°C prior to analysis, and the storage time should be kept to a minimum. For longer periods store samples at –80°C. Avoid repeated freezing and thawing.

Plasma

Collect blood by venipuncture into tubes containing heparin or EDTA as anticoagulant, and separate the plasma fraction by centrifugation. Plasma samples should be stored at 2–8°C prior to analysis, and the storage time should be kept to a minimum. For longer periods store samples at –80°C. Avoid repeated freezing and thawing.

Urine

Collect a 24 hour urine sample (without preservative). Keep the specimen at 2–8°C between collections. Record the total volume of the specimen and retain a well mixed aliquot for analysis. Store the samples at 2–8°C for a maximum of 24 hours before assay. For longer storage, keep the urine samples frozen at –70°C until assay is performed. Repeated freezing and thawing must be avoided. Cellular debris should be removed before assay, either by filtration or centrifugation.

Preparation of samples

Urine samples above Calibrator 5 should be diluted 1/10 in Calibrator 0. Dilution is normally not required for serum and plasma samples, however, samples with a concentration above Calibrator 5 should be diluted in Calibrator 0.

Test procedure

All reagents and samples must be brought to room temperature before use. Prepare a calibrator curve for each assay run. The product has been optimized and validated without plate sealer.

1. Prepare enzyme conjugate 1X solution and wash buffer 1X solution.
2. Prepare sufficient microplate wells to accommodate Calibrators 1-5, Calibrator 0 (negative control), positive controls, and samples in duplicate.
3. Pipette 25 µL each of Calibrators, controls and samples into appropriate wells.
4. Add 50 µL of Assay Buffer to each well.
5. Incubate on a plate shaker for 1 hour (700-900 rpm) at room temperature (18–25°C).
6. Wash 6 times with 700 µL wash buffer 1X solution per well using an automatic plate washer with overflow-wash function, after final wash, invert and tap the plate firmly against absorbent paper. Do not include soak step in washing procedure.
   Or manually:
   discard the reaction volume by inverting the microplate over a sink.
   Add 350 µL wash solution to each well. Discard the wash solution, tap firmly several times against absorbent paper to remove excess liquid.
   Repeat 5 times. Avoid prolonged soaking during washing procedure.
7. Add 100 µL enzyme conjugate 1X solution to each well.
8. Incubate on a plate shaker for 1 hour (700-900 rpm) at room temperature (18–25°C).
9. Wash as described in step 6.
10. Add 200 µL Substrate TMB.
11. Incubate on the bench for 15 minutes at room temperature (18–25°C).
12. Add 50 µL Stop Solution to each well.
    Place plate on a shaker for approximately 5 seconds to ensure mixing.
13. Read optical density at 450 nm and calculate results.
    The plate must be read within 30 minutes.

Note! Be extra careful not to contaminate the Substrate TMB with enzyme conjugate solution.

Internal quality control

Commercial controls such as Mercodia Diabetes Antigen Control (Cat No. 10-1134-01/10-1164-03) and/or internal serum pools with low, intermediate and high C-peptide concentrations should routinely be assayed as samples, and results charted from day to day. It is good laboratory practice to record the following data for each assay: kit lot number, preparation date of components, OD values for Calibrators 1-5, and the positive and negative controls.

Calculation of results

The concentration of C-peptide is determined by plotting the optical density (OD) at 450 nm of Calibrators 1-5 against their respective concentrations. Calibrator 0 should be used solely as a negative control and not included in the calibration curve.

It is important to use an appropriate curve fitting model that represents the true dose-response relationship to get accurate results. It is every laboratory's responsibility to validate the functionality of the chosen curve fitting model and software used.

The 10-1136-03 C-peptide ELISA from Mercodia was validated using cubic spline curve fit.

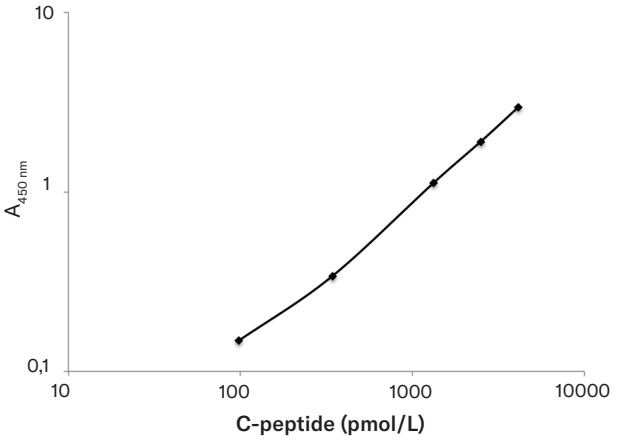
Example of results

Wells	Identity	$A_{450\ nm}$	Mean conc. pmol/L
1A–B	Calibrator 0	0.072/0.070	
1C–D	Calibrator 1*	0.146/0.149	
1E–F	Calibrator 2*	0.340/0.339	
1G–H	Calibrator 3*	1.128/1.113	
2A–B	Calibrator 4*	1.878/1.939	
2C–D	Calibrator 5*	2.977/2.951	
2E–F	Sample 1	0.311/0.321	316
2G–H	Sample 2	0.991/0.959	1065
3A–B	Sample 3	1.737/1.766	2172

*Concentration stated on vial lable

Example of calibrator curve

A typical calibrator curve is shown here. Do not use this curve to determine actual assay results.



Limitations of the procedure

Grossly lipemic, icteric or hemolysed samples do not interfere with the assay.

Expected values

Good practice dictates that each laboratory establishes its own expected range of values. The following results may serve as a guide until the laboratory has gathered sufficient data of its own.

Fasting serum levels for 136 tested, apparently healthy individuals, yielded a mean of 742 pmol/L (2.2 µg/L), a median of 628 pmol/L (1.9 µg/L) and a range, corresponding to the central 95% of the observations, of 343–1803 pmol/L (1.0–5.4 µg/L).

Performance characteristics

Detection limit

Detection limit is defined as the Capability of Detection according to ISO11843-Part 1. Capability of Detection should be seen as part of a method validation, rather than the lowest concentration that can be measured. The detection limit is 25 pmol/L as determined by the methodology described in ISO11843-Part 4. Concentration of samples with absorbance below Calibrator 1 should not be calculated, instead expressed as less or equal to (≤) the concentration indicated on the vial for Calibrator 1.

Recovery

Serum: Recovery upon addition is 96%-108% (mean 102%).
Recovery upon dilution is 97%–107% (mean 102%).

Hook effect

Samples with a concentration of up to at least 1 750 000 pmol/L can be measured without giving falsely low results.

Precision

Each sample was analyzed in 4 replicates on 7 different occasions.

		Coefficient of variation	
Sample	Mean value pmol/L	Repeatability %*	Within laboratory %**
1	304	4.8	6.8
2	818	3.1	5.4
3	1803	2.9	3.0

*Within assay variation
**Total assay variation

Specificity

The following crossreactions have been found:

	Crossreaction
Insulin	<0.0006 %
Proinsulin	2 %
Proinsulin des (31-32)	3 %
Proinsulin split (32-33)	2 %
Proinsulin des (64-65)	74 %
Proinsulin split (65-66)	10 %
Canine C-peptide	n.d.

n.d. = not detected

Calibration

Mercodia C-peptide ELISA kit is calibrated against the International Reference Reagent for C-peptide, IRR C-peptide 84/510.

Conversion factor

1 µg/L corresponds to 331 pmol/L.

Warranty

The performance data presented here was obtained using the procedure indicated. Any change or modification in the procedure not recommended by Mercodia AB may affect the results, in which event Mercodia AB disclaims all warranties expressed, implied or statutory, including the implied warranty of merchantability and fitness for use.

Mercodia AB and its authorized distributors, in such event, shall not be liable for damages indirect or consequential.

References

Gaines-Das RE and Bristow AF (1988) WHO international reference reagents for human proinsulin and human insulin C-peptide. *J Biol Stand* 16:179-186.

Riserus U, Vessby B, Arner P, Zethelius B (2004) Supplementation with trans10cis12-conjugated linoleic acid induces hyperproinsulineamia in obese men: close association with impaired insulin sensitivity. *Diabetologia* 47:1016-1019.

Rudovich NN, Rochlitz HJ, Pfeiffer AF (2004) Reduced hepatic insulin extraction in response to gastric inhibitory polypeptide compensates for reduced insulin secretion in normal-weight and normal glucose tolerant first-degree relatives of type 2 diabetic patients. *Diabetes* 53:2359-65.

Further references can be found on our website: **www.mercodia.com**

Notes

Notes

Notes

	1	2	3	4	5	6	7	8	9	10	11	12
A												
B												
C												
D												
E												
F												
G												
H												

Experiment: Date: KIT LOT#:

Summary of protocol sheet
Mercodia C-peptide ELISA

Add Calibrators, controls* and samples	25 µL
Add Assay Buffer	50 µL
Incubate	1 hour at 18–25°C on a shaker 700-900 rpm
Wash plate with wash buffer 1X solution	700 µL, 6 times
Add enzyme conjugate 1X solution	100 µL
Incubate	1 hour at 18–25°C on a shaker 700-900 rpm
Wash with wash buffer 1X solution	700 µL, 6 times
Add Substrate TMB	200 µL
Incubate	15 minutes at 18-25°C
Add Stop Solution	50 µL Shake for 5 sec to ensure mixing
Measure $A_{450\ nm}$	Evaluate results

*not included

For full details see page 6

For technical support please contact: support@mercodia.com

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