Perspective of C-peptide From Diabetes Window

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Objectives

- The C-peptide consists of degradation of proinsulin.
- It is produced in equal amounts with insulin and indicates endogenous insulin production.
- It is superior to insulin in showing β-cell functions since it is not affected by external insulin intake.
- The reference range for the C-peptide is 1.1-4.4 ng /mL.
- The C-peptide can be made at fasting, during stimulation, and at random times.
- It is a good marker for β-cell capacity.

Objectives

- C-peptide is a useful and widely used method of assessing pancreatic beta cell function.
- After cleavage of proinsulin, insulin and the 31-amino-acid peptide c-peptide are produced in equal amounts.
- So why is c-peptide testing preferable to insulin as a guide to beta cell function?
- In healthy individuals the plasma concentration of c-peptide in the fasting state is 1–2 ng/L with a postprandial increase to 3–9 ng/mL.

Objectives

- Half of all insulin secreted by the pancreas is metabolized in the liver by first-pass metabolism, whereas c-peptide has negligible hepatic clearance.
- C-peptide is cleared in the peripheral circulation at a constant rate, whereas insulin is cleared variably making direct measurement less consistent.
- In insulin-treated patients with diabetes, measurement of c-peptide also avoids the pitfall of cross-reaction of assay between exogenous and endogenous insulin.

Objectives

- C-peptide is a cornerstone of the assessment of non-diabetes-associated hypoglycemia and the diagnosis of conditions such as insulinoma and factitious hypoglycemia.
- Increasing evidence suggests that c-peptide may also be useful in predicting future levels of glycemic control, response to hypoglycemic agents, and risk of future diabetes complications.
- The majority of c-peptide is metabolized by the kidneys with 5–10% then excreted unchanged in the urine.
- This can make c-peptide measurement in individuals with chronic kidney disease inaccurate.

Objectives

- C-peptide has been shown in vitro to inhibit endothelial cell reactive oxygen species (ROS) formation in the presence of hyperglycemia.
- C-peptide also downregulates the expression of several hyperglycemia-induced adhesion molecules, including vascular cellular adhesion molecule 1 (VCAM1), reducing leukocyte adhesion to endothelial cell walls and preventing the early stages of atherosclerosis plaque formation.
- It seems that c-peptide is associated with increasing microvascular complications

Objectives

- In recent years, the use of β-cell capacity for insulin use in the treatment of Type 2 DM has been recommended.
- According to the C-peptide level, the use of oral antidiabetics has been prescribed.
- Today, C-peptide is used not only for the differentiation of Type 1 and 2, but also for monitoring pancreatic capacity.
- In this study, we aimed to emphasize the importance of C-peptide in the diagnosis and treatment of DM.

Material and Methods

- The number of C-peptide tests studied by the medical biochemistry laboratory of our hospital in the last 5 years were classified according to years.
- Subsequently, the annual changes were grouped as below 1.1 ng/mL, 1.1-4.4 ng/mL and> 4.4 ng/mL, and % changes were found.

Results

- According to the automation data, 6794 C-peptide analyzes have been performed in our laboratory in the last 5 years.
- Percentage distribution of patients by years was found respectively as 11.2, 11.4, 18.0, 23.2, 36.3.
- The annual percentage distribution of patients with C-peptide <1.1 was respectively 23.2, 42.1, 19.7, 35.0, 10.9.
- The ratio of patients with C-peptide between 1.1-4.4 were 56.0, 31.4, 62.7, 52.1, 73.6 per years.
- The ratio of patients with C-peptide> 4.4 to overall patients in the same year was 20.8, 26.5, 17.6, 12.9, 15.4.

Results

Years	Annual total rate	<1.1ng/mL	1.1-4.4ng/mL	>4ng/mL
2014	11,20	23,2	56	20,8
2015	11,4	42,1	31,4	26,5
2016	18	19,7	62,7	17,6
2017	23,2	35	52,1	12,9
2018	36,3	10,9	73,6	15,4

% distribution table

Conclusions

- An area of growing research is the question as to whether c-peptide can be used to predict diabetes complications.
- Lower c-peptide values have been associated with poorer glycemic control and hence increased HbA1c values.
- Lower levels of c-peptide and decreased beta cell function have been linked to greater levels of glucose variability.
- As glucose variability is known to be associated with increased complications and mortality in patients with diabetes it is possible that c-peptide may be a predictor of future outcomes independent of HbA1c levels

Conclusions

- There was a continuous increase in the number of test requests.
- The C-peptide is used not only for DM classification but also for the follow-up of DM patients.
- We think that this will reduce the need for parenteral insulin treatment.
- We think that the clinical laboratory planning should be made accordingly.