

Glucagon Stimulation C-peptide testing

HOSP #		WARD	Endocrinology ward
CONSULTANT	Dr. Heleen Vreede	DOB/AGE	22 y Male

Abnormal Result

Patient presented with Diabetic Ketoacidosis and a glucose value of 27.4 mmol/L.

Presenting Complaint

Signs and symptoms typical of Diabetic Ketoacidosis

History

Patient was diagnosed with diabetes 7 years ago after presenting with diabetic ketoacidosis. Upon diagnosis he was given insulin in the hospital. Upon discharge he was given Metformin and Glimeperide (oral hypoglycemic medication – reason for oral agents unknown – likely because of his young age?). Defaulted Rx completely. Presented with DKA again. Restarted about 2 y ago on insulin.

The differential diagnosis at the current presentation is thus one of:

1. Ketosis prone diabetes
2. LADA (Latent auto-immune diabetes of the adult)
3. Type1 – went into honeymoon phase after diagnosis and now relapsed

To differentiate – the clinicians prompted to do antibodies, insulin levels and a glucagon stimulation c-peptide dynamic

test.

Examination

N/A

Laboratory Investigations

Date	05/02/2021	02/02/2021	28/08/2018	25/01/2018	05/06/2017	03/03/2017	03/03/2017	24/02/2017	16/09/2016	14/04/2015
Na		134 L					137.000			133 L
K		4,6					4.890		4,5	UOLD2
Cl		93 L								
Urea		13,4 H					5.000			1,9 L
Creat		91					69.000		66	34 L
Glu Random				27,4				21.860		
HbA1c (NGSP)		12,7	>14	13,7	>14			12,8	13,7	
Total chol	5,04						6- 4,98			
Triglyceride	1,74						1,25			
HDL chol	1,35						1,16			
LDL chol (calc)	2,89						3,25			
Total chol									8,99	
U creat	4,1						1,9			
U albumin	32.70						<3			
U alb : creat	8.0 H						UTC			
Test referred						Anti-IA2 Antibody Positive; Anti-GAD antibody Positive				

Other Investigations

A glucagon-stimulated C-peptide level was drawn.

0 min	1.5 ug/L	0.5 nmol/L
1 min	2.0 ug/L	0.67 nmol/L
2 min	1.9 ug/L	0.63 nmol/L
3 min	1.9 ug/L	0.63 nmol/L

Final Diagnosis

LADA – latent autoimmune diabetes of the adult

Take Home Message

Serum c-peptide has traditionally been thought to be an inconvenient method as immediate lab analysis is required before degradation (when collected in serum gel or plain sample tubes). This is because c-peptide is a small linear peptide, which is susceptible to enzyme proteolytic cleavage. Gel tubes are therefore traditionally required to be transported to the lab on ice, promptly centrifuged and separated, then stored in frozen conditions unless lab analysis is possible at that center.

However, c-peptide sample collection for c-peptide determination in whole blood in EDTA prepared tubes is stable at room temperature for up to 24 h. Venous blood c-peptide levels can be measured in the random, fasting, or stimulated scenarios. Random samples are taken at any time during the day without consideration of recent food intake, whereas fasting samples are taken after an 8- to 10-h fast.

Stimulation methods include using

- glucagon
- intravenous/oral glucose
- tolbutamide
- sulfonylurea
- glucose-like peptide 1
- amino acids
- a mixed meal

In this case a glucagon stimulation yielded sufficient results to assist the clinicians in making the diagnosis, indeed a case of atypical diabetes presentation.