

Type 1 Diabetes vs Type 2 Diabetes Refresher

Shaveta Gupta, MD



Case 1

A 30-year-old woman comes as a new patient for evaluation of diabetes mellitus. She was recently admitted to an outside hospital about 4 weeks ago with diabetic ketoacidosis. She was treated with intravenous insulin and discharged 3 days later. At the time of the discharge, her home medications were re-started.

- **Past Medical History** - hypothyroidism and hypertension for which she takes levothyroxine 75 mcg QAM and Lisinopril 40mg daily.
- **Diabetes History**-
 - diagnosed about 7 years ago.
 - microvascular complications + nephropathy with microalbuminuria 75 mg/day.
 - uncontrolled - hemoglobin A1c ranging 11%-12%.
 - Treatment basal-bolus insulin regimen – insulin glargine 12 units qHS and insulin Humalog 5 units AC.
 - About 2 months ago, she was started on empagliflozin 10mg daily for renal protection.

Case 1 cont.

- She is compliant with her medications, however, reports that she had flu-like illness 3 days prior to admission and stopped eating due to loss of appetite.
- She stopped taking insulin but continued taking other medications – levothyroxine, Lisinopril, empagliflozin.
- She has not been monitoring her blood glucose values at home.
- Her family history is significant for rheumatoid arthritis in her mother.
- On physical examination, her blood pressure is 122/73 and BMI is 22kg/m². The rest of the examination findings are unremarkable.

Case 1 cont.

- Thoughts?
- What tests would you perform to establish the diagnosis and guide the patient's long-term diabetes management?
- Would you make any changes to the medications at present?

Type 1 Diabetes Mellitus

- Autoimmune destruction of pancreatic cells -> insulin deficiency and hyperglycemia.
- Insulin deficiency -> acute metabolic decompensation known as diabetic ketoacidosis (DKA).

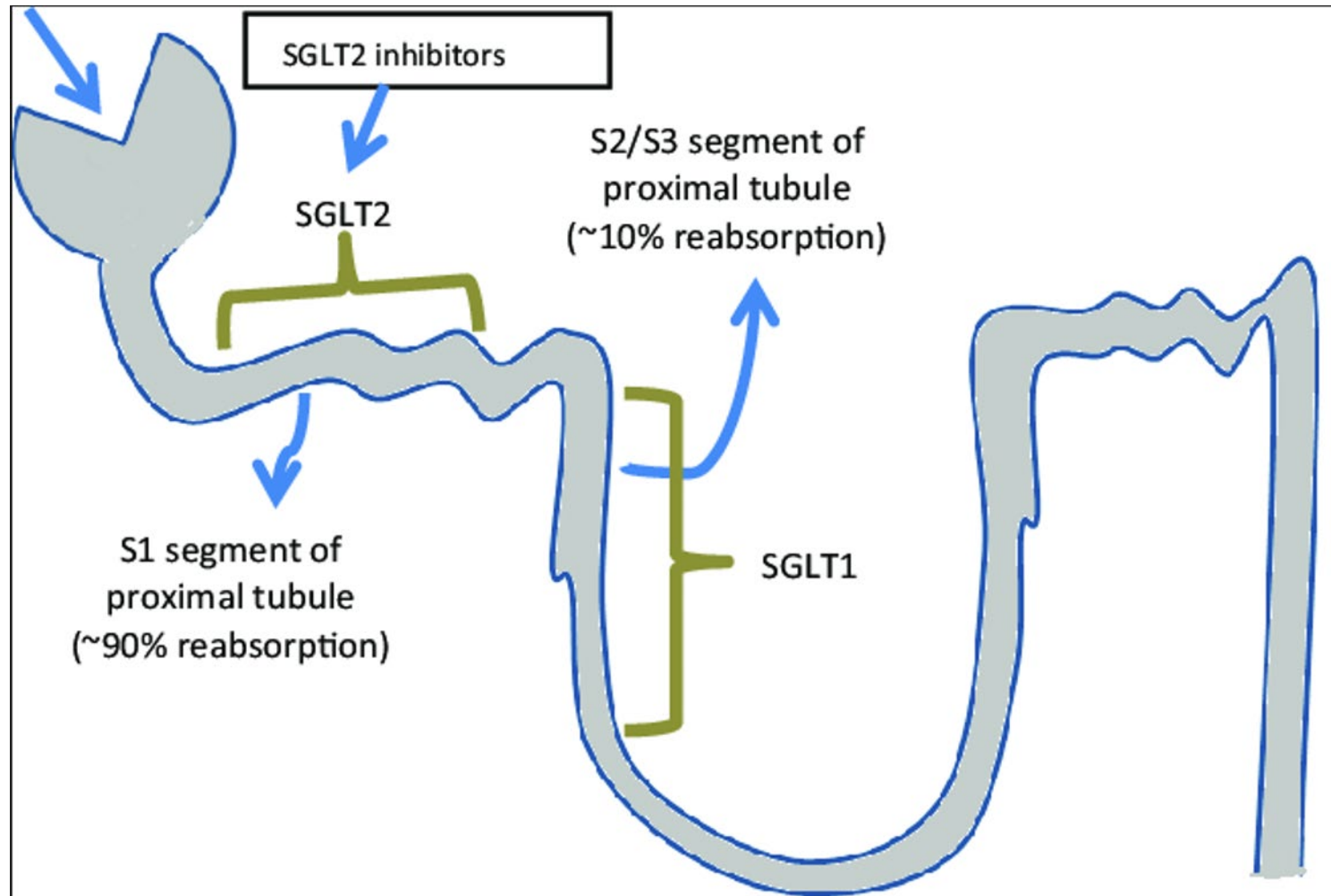
Etiology

- The autoimmune process selectively destroys pancreatic β cells.
- Antibodies to glutamic acid decarboxylase (GAD65), to tyrosine phosphatases IA-2 and IA-2 beta, insulin (IAA) and zinc transporter (ZnT8)
- Other autoimmune diseases can occur eg. autoimmune thyroid disease, pernicious anemia, celiac sprue, vitiligo.

Diagnosis

- Diagnosis of diabetes mellitus – based on guidelines by ADA
- Differentiation from other types of diabetes
- Clinical presentations that may warrant measurement of autoantibodies include:
 - Catabolic presentation (eg, weight loss, ketonuria)
 - Lean body habitus with no features of metabolic syndrome
 - Personal history of autoimmune diseases
 - Strong family history of autoimmune disease, including type 1 diabetes
 - Adolescents or young adults with overweight or obesity who present with apparent type 2 diabetes, who may have type 1 diabetes that has not yet progressed to insulin deficiency
 - Presence of autoantibodies
 - Islet autoantibodies - glutamic acid decarboxylase [GAD]-65, insulin, tyrosine phosphatase 2 [IA-2], zinc transporter 8).
 - Measuring more than one autoantibody increases the likelihood of a positive value, though it is more costly. A common approach is to measure two or three antibodies (GAD65 and one or two others).
- C-peptide levels - Measure a paired fasting C-peptide and glucose level to get a sense of the degree of insulin deficiency. Although these levels are not standardized, a nonstimulated low C-peptide in association with hyperglycemia in the nonacute setting is consistent with type 1 diabetes.
- Glucagon-stimulated C-peptide is not routinely used in clinical practice, but a level less than 0.2 nmol/L is suggestive of type 1 diabetes mellitus

SGLT2-i



SGLT2-i

- SGLT2 inhibitors are associated with an increased risk of diabetic ketoacidosis (DKA)
- Associated with euglycemic (usually meaning plasma glucose <250 mg/dL) DKA.
- Any benefit in reducing A1C and body weight is offset by the increased risk for adverse effects, including diabetic ketoacidosis (DKA).
- SGLT2 inhibitors are not approved by the FDA for use in type 1 diabetes due to the risk of DKA.

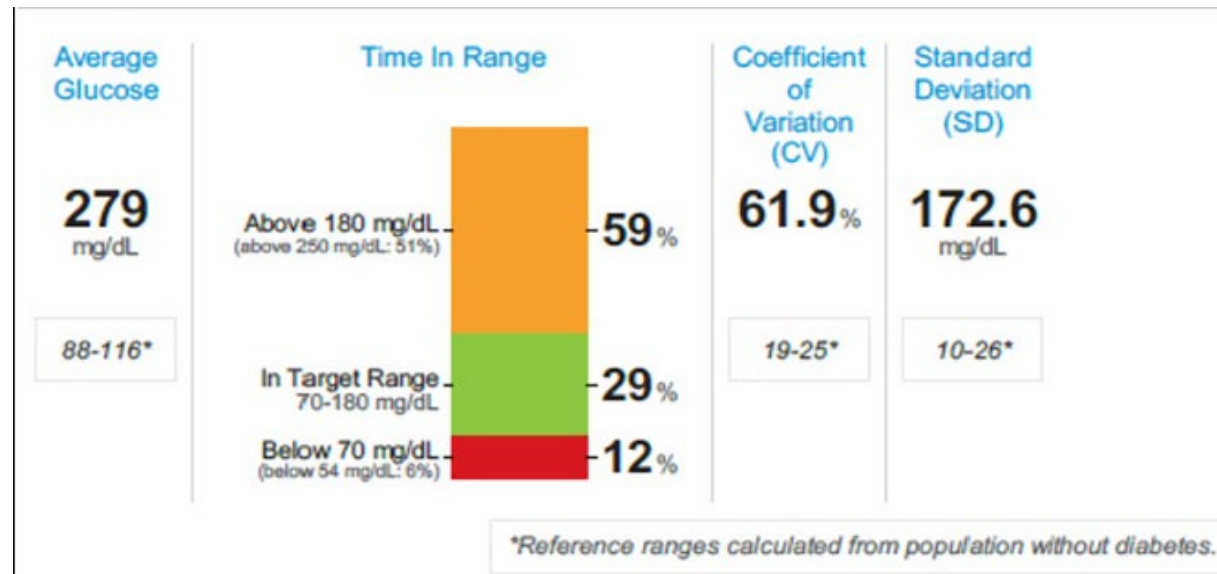
Case 2

A 45-year-old man comes as a new patient for evaluation of diabetes mellitus.

- **Past Medical History** – Hypertension, Hyperlipidemia
- **Diabetes History-**
 - Diagnosed about 12 years ago.
 - Microvascular complications + severe retinopathy and peripheral neuropathy.
 - On basal-bolus insulin regimen – insulin glargine 40 units qHS and insulin Humalog 12 units AC.
 - In the past, he was on insulin pump (Medtronic) and had 3 episodes of DKA that were reportedly due to pump malfunction. Subsequently, he stopped using the pump and switched to MDI and accu-checks.
 - At his last visit, he was started on CGM.

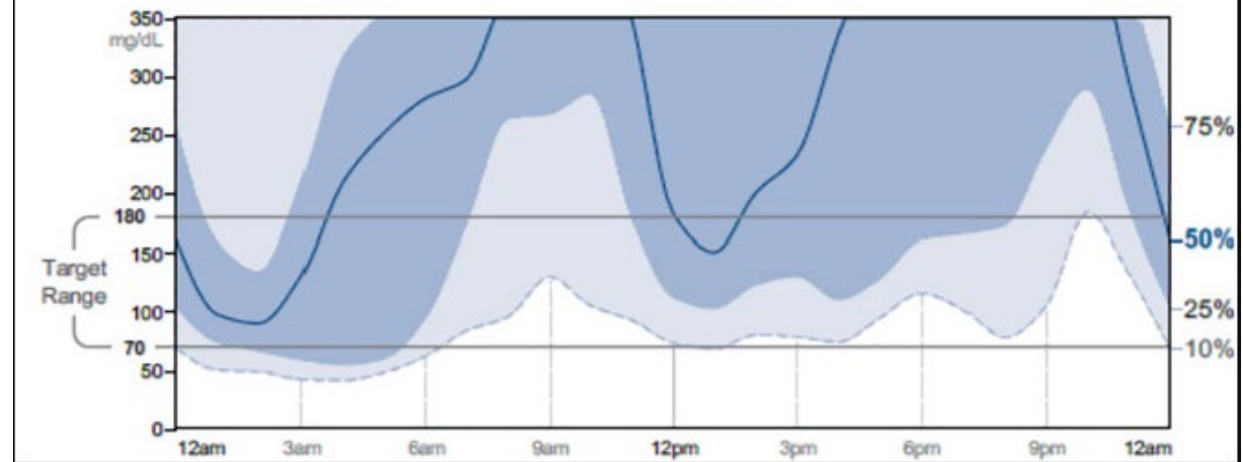
Case 2 cont.

- He is compliant with his medications.
- On physical examination, blood pressure is 122/73 and BMI is 30.8 kg/m².
- He has central adiposity.
- Rest of the examination is unremarkable.



Ambulatory Glucose Profile

Curves/plots represent glucose frequency distributions by time regardless of date



Thoughts?

- High glucose variability refers to wide glycemic excursions that occur within the same day, including fluctuations between hyperglycemia (typically postprandial) and hypoglycemia, as well as fluctuations that occur at the same time on different days.
- Occurs in adults with absolute insulin deficiency (undetectable C-peptide levels)
- These individuals usually have type 1 diabetes or pancreatic diabetes (eg, post-pancreatectomy).



Thank you!