

## Introduction

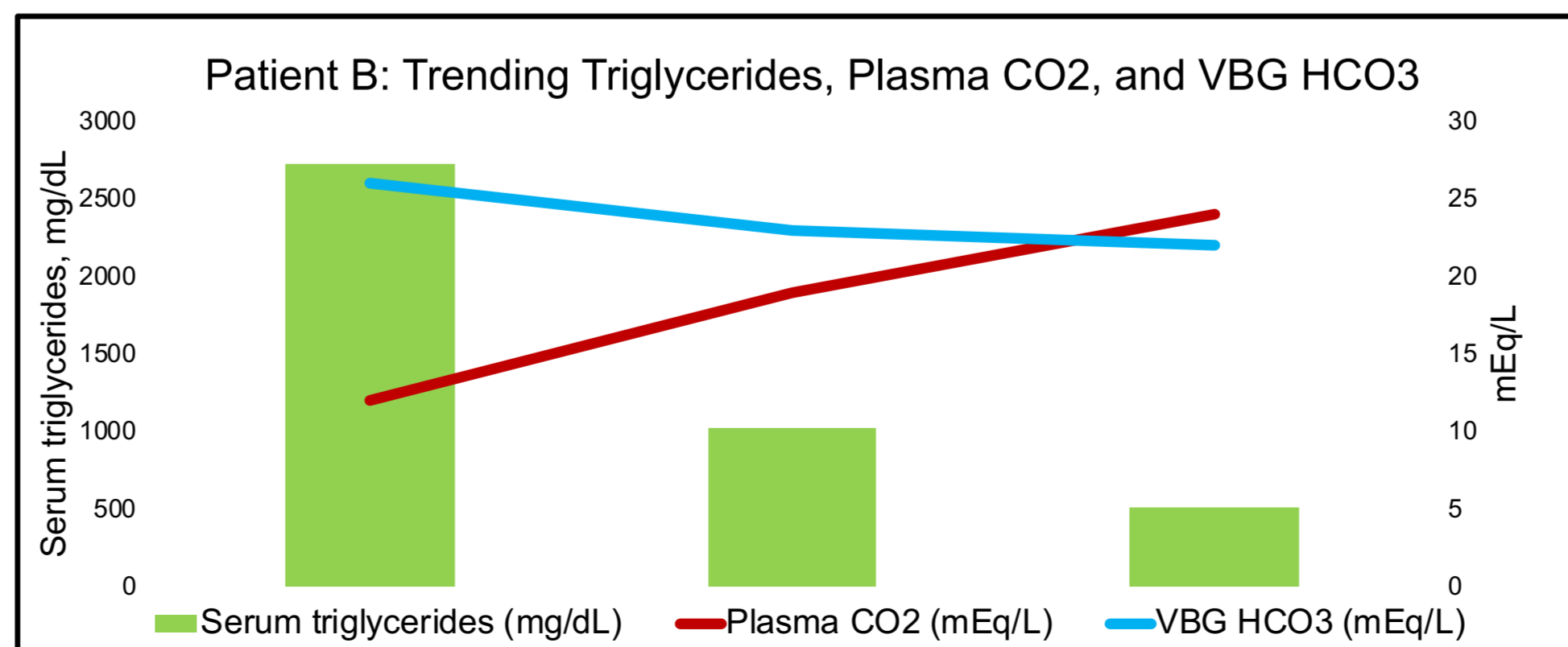
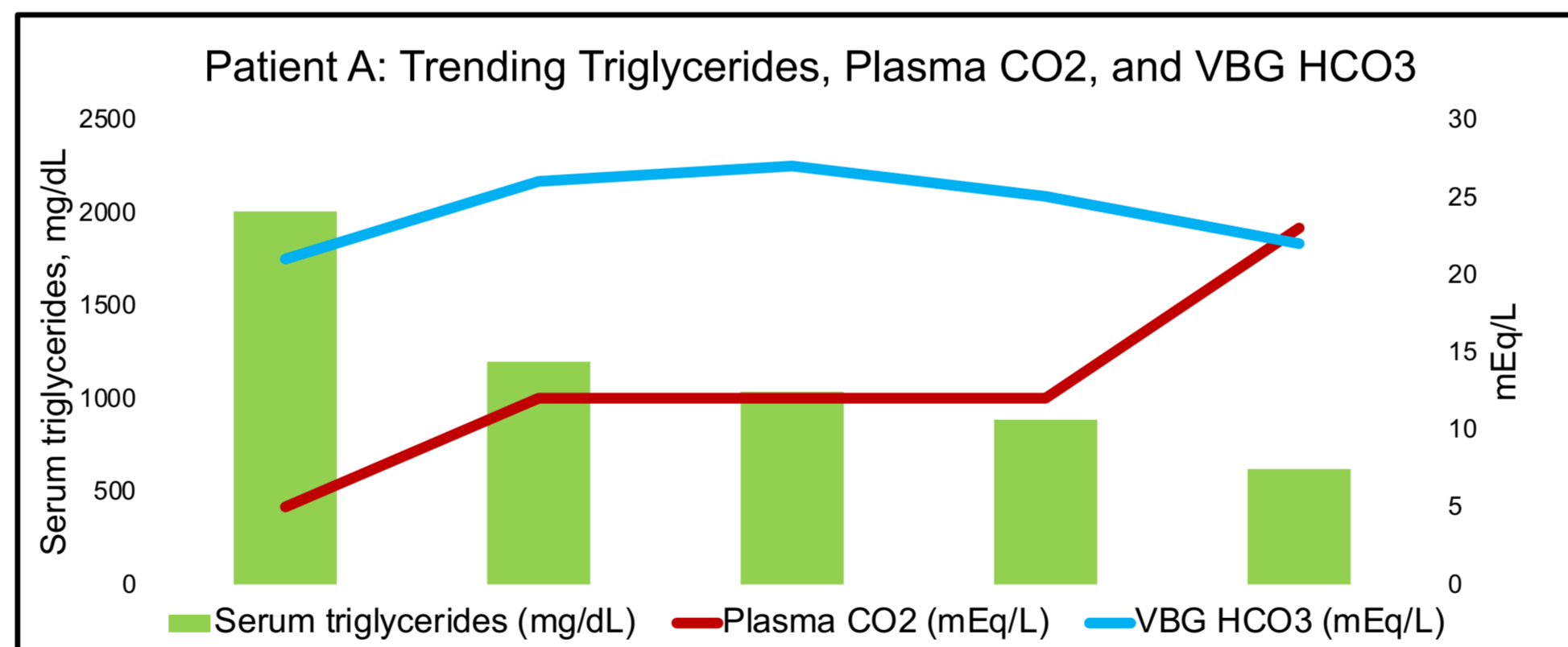
- Pseudohypobicarbonatemia is a rare and spurious finding in which the measured serum bicarbonate is lower than the calculated bicarbonate level.
- Total serum bicarbonate is derived from measuring serum carbon dioxide using an enzymatic/photometric assay while the calculated bicarbonate level is derived from the pH and partial pressure of carbon dioxide using the Henderson-Hasselbalch equation.
- Measured and calculated bicarbonate values are used interchangeably in the clinical setting to define conditions that lead to metabolic acidosis such as diabetic ketoacidosis (DKA).
- However, the measured bicarbonate levels may be affected by excessive triglycerides and therefore be erroneously reported as low, falsely implying a state of metabolic acidosis.

## Methods

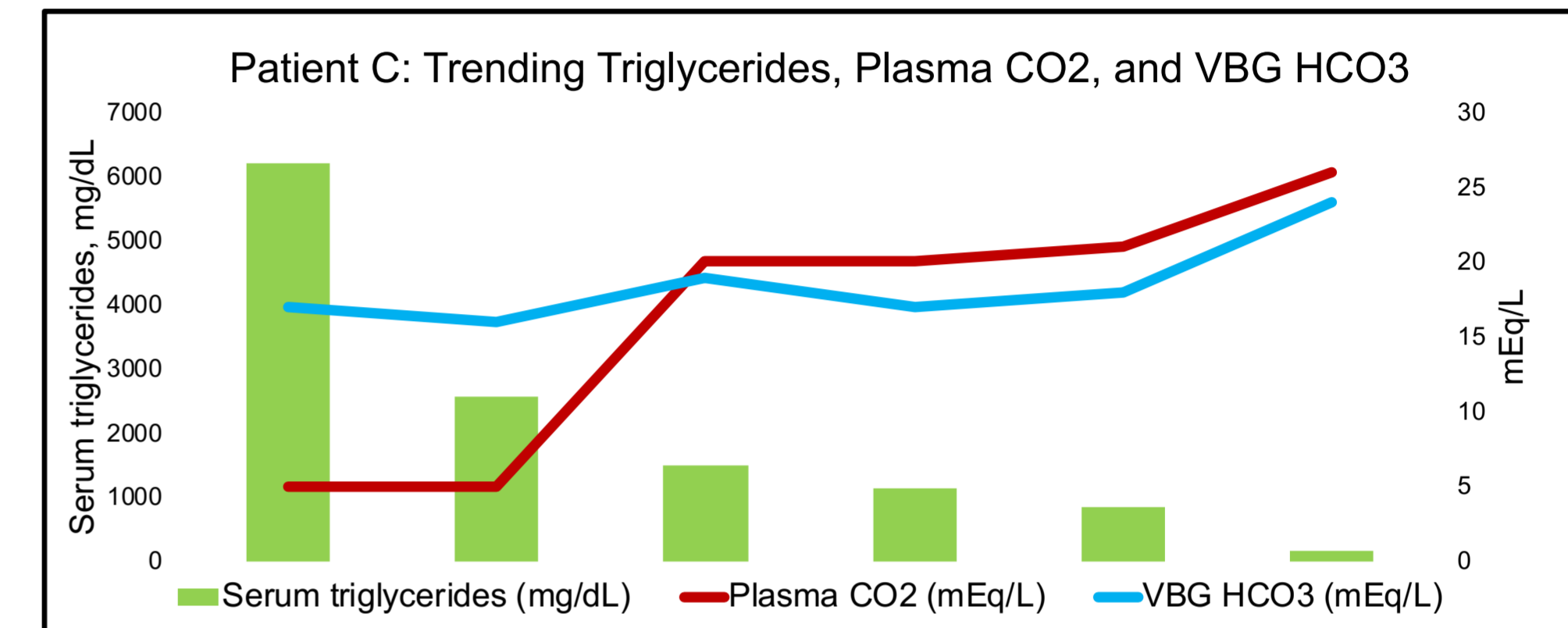
- We present a retrospective series of 3 pediatric patients with severe hypertriglyceridemia in the setting of new onset or known DM that were assumed to be in DKA based on their initial presentations.
- All 3 patients presented with hyperglycemia (glucose >200 mg/dL), ketosis, serum bicarbonate <15 mEq/L, consistent with the definition of DKA.
- However, the venous blood gas-panel (VBG) derived bicarbonate (HCO<sub>3</sub>) levels were noted to be much higher and not consistent with DKA.

## Case Presentation

	<u>Patient A</u>	<u>Patient B</u>	<u>Patient C</u>
Age (years)	17	17	16
Sex	Male	Male	Female
DM history	Type 2, New	Type 2	Type 2
HbA1C (%)	9.7	11.6	13.2
Plasma glucose (mg/dL)	734	314	351
Plasma CO <sub>2</sub> (mEq/L)	< 10	12	< 10
VBG pH	7.31	7.36	7.35
VBG pCO <sub>2</sub> (mmHg)	42	45	30
VBG HCO <sub>3</sub> (mEq/L)	21	26	17
Urine ketones	1+	1+	2+
Serum triglycerides (mg/dL)	2008	2718	6199



## Case Presentation



## Discussion

- Insulin resistance leads to a high rate of adipocyte lipolysis, increasing hepatic free fatty acids which in turn stimulate hepatic VLDL production leading to increased serum triglycerides.
- Additionally, insulin resistance decreases lipoprotein lipase function which leads to decreased triglyceride catabolism and further contributes to elevated triglycerides.
- Hypertriglyceridemia has previously been reported as an endogenous interferent that may lead to low serum bicarbonate levels.
- The discrepancy stems from laboratory analyzers that measure serum carbon dioxide absorbance through a phosphoenolpyruvate carboxylase reaction.
- Elevated triglycerides disrupt spectrophotometry by absorbing light, thereby providing artificially lower serum bicarbonate values.

## Conclusion

- Uncontrolled DM and insulin resistance leads to hypertriglyceridemia.
- Measured serum bicarbonate and gas-panel derived bicarbonate levels are frequently used interchangeably in the diagnosis and management of DKA.
- This case series highlights the importance of being aware of the discordance between measured and calculated bicarbonate levels, and recognizing that there may be an interfering analyte such as excessive triglycerides that leads to falsely low measured bicarbonate values.