



RESPONSE TO COMMENTS ON BRETHAUER ET AL.

## Bariatric Surgery Improves the Metabolic Profile of Morbidly Obese Patients With Type 1 Diabetes. *Diabetes Care* 2014;37:e51–e52

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John P. Kirwan,<sup>1</sup> Stacy A. Brethauer,<sup>2</sup>  
Ali Aminian,<sup>2</sup> Raul J. Rosenthal,<sup>3</sup>  
Sangeeta R. Kashyap,<sup>1</sup>  
and Philip R. Schauer<sup>2</sup>

We thank Middelbeek and Brown (1) for their interest in our work and for their comments on our article (2) about the effects of bariatric surgery in type 1 diabetes. We agree with their view that the metabolic responses to bariatric surgery in severely obese patients with type 1 diabetes are poorly understood. Hence, we thought it was important to publish our data, albeit limited to a retrospective analysis of 10 patients with type 1 diabetes who underwent bariatric surgery at the Cleveland Clinic. They point out that we did not distinguish whether our patients were being treated by continuous subcutaneous insulin infusion (CSII) or multiple daily injections (MDI). We would like to clarify that out of the 10 patients we reported, 5 were on CSII and 5 were on MDI. Further, conversion from one treatment method to the other was not observed after bariatric surgery. Pre- and postoperative insulin requirements were reported as units/kg/day. In CSII-treated patients, only the basal insulin contribution to the total daily dose of insulin was included. Although less reliance on exogenous insulin is noted, it is unclear whether decreased caloric intake, weight loss, or hepatic glucose production account for the reduced basal insulin requirements, and whether improved intestinal biology (i.e., incretins, bile acids, etc.) and insulin action explain

the reduced prandial/bolus insulin requirements, as observed in patients with obesity and type 2 diabetes.

Tang et al. (3) also found our report to be of interest and provide additional data from obese patients with type 1 diabetes who underwent bariatric surgery at their institution. Of six reported cases, two had a >1% drop in HbA<sub>1c</sub>, and in the other four patients, despite having relatively little change in HbA<sub>1c</sub> after surgery, insulin requirements decreased significantly. Their conclusion that bariatric surgery does not universally improve glycemic control is reasonable for the data they present; however, it is a very small sample size and as they correctly point out, the patient characteristics differ between our two reports. In addition, gastric bypass, banding, sleeve gastrectomy, and duodenal switch all have differential effects on weight loss and other factors that may affect glycemic control in type 1 diabetic patients; hence, procedure type may partly explain their data.

The discrepancy in outcomes and conclusions drawn regarding the magnitude of the effect of bariatric surgery on glycemic control in the type 1 diabetic patient is complex and cannot be resolved through these short reports. Additional clinical experience and investigation are needed to better understand the contribution of dietary macro- and micro-nutrient changes, activity patterns,

adherence to scheduled insulin, and the impact of other obesity comorbidities (i.e., sleep apnea, hypogonadism) following bariatric surgery on glucose metabolism and basal versus bolus insulin requirements in patients with type 1 diabetes. Nevertheless, our conclusion that bariatric surgery may enhance medical management of obese patients with type 1 diabetes is supported by data from both of these research teams. These additional contributions only serve to further highlight the critical need for larger, more extensive prospective studies on the role of bariatric surgery in the treatment and management of type 1 diabetes.

**Duality of Interest.** No potential conflicts of interest relevant to this article were reported.

### References

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<sup>1</sup>Endocrinology and Metabolism Institute, Cleveland Clinic, Cleveland, OH

<sup>2</sup>Bariatric and Metabolic Institute, Cleveland Clinic, Cleveland, OH

<sup>3</sup>Bariatric and Metabolic Institute, Cleveland Clinic Florida, Weston, FL

Corresponding author: John P. Kirwan, kirwanj@ccf.org.

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