

COMMENTS AND RESPONSES

Association of Vitamin D With Insulin Resistance and β -Cell Dysfunction in Subjects at Risk for Type 2 Diabetes

Response to Muscogiuri et al.

We thank Muscogiuri et al. (1) for their insightful comments regarding our study and appreciate the opportunity to address them. Muscogiuri et al. suggest that our study sample primarily consisted of obese subjects, as the mean BMI of our subjects was 30.5 kg/m². In fact, BMI ranged from 18.2 to 60.1 kg/m², and 28% had a BMI <27 kg/m². Thus, our study subjects represented a broad range of body mass.

Muscogiuri et al. further suggest that our documented association between 25(OH)D with insulin resistance was likely explained by fat mass. However, the final model in Table 1 of our article was adjusted for BMI, and the association remained statistically significant. A similar result was obtained when we adjusted for waist circumference instead of BMI. It should be noted that several other studies (2,3) have reported significant associations between 25(OH)D and insulin resistance after adjustment for BMI or waist circumference. In addition, a recent report from the Framingham Heart Study (4) found a significant inverse association between 25(OH)D and insulin resistance

after adjustment for BMI or waist circumference. More importantly, the association between 25(OH)D and insulin resistance remained significant even after adjustment for subcutaneous fat mass, measured directly by computed tomography imaging.

Muscogiuri et al. also cite two trials in which vitamin D supplementation did not influence insulin resistance. In fact, there is inconsistent evidence from published randomized controlled trials that have assessed the effectiveness of vitamin D supplementation in reducing insulin resistance. Notably, a recent study (5) reported that vitamin D supplementation was effective in improving insulin resistance among insulin-resistant women.

In summary, although the evidence for a role of vitamin D in insulin resistance remains inconclusive, a growing body of compelling data points in this direction. In addition, it is notable that β -cell dysfunction, which is a key disorder in diabetes pathogenesis alongside insulin resistance, was also found to be independently associated with vitamin D in our study. Additional studies are clearly needed to further reconcile the pathogenic role of vitamin D in type 2 diabetes.

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S.K., S.B.H., B.Z., and A.J.H. researched data. S.K. wrote the manuscript. All authors reviewed/edited the manuscript and contributed to the discussion.

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