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To the Editor-in-chiefs (Drs. Burrowes and Wanner)

In the February issue of this journal, Mohebi et al. reported that, among men with chronic kidney disease (CKD), greater fat mass was associated with improved survival¹. The same authors also demonstrated that abdominal obesity was associated with 30% lower risk of developing CKD over 10-year follow-up in adults². In addition, a meta-analysis by Carnethon et al. found that overweight adults with type 2 diabetes are at a lower risk for mortality than their normal weight diabetic peers³. Diabetes remains the leading cause of CKD in the western world, with early diabetic kidney disease presenting in adolescence in type 1 and 2 diabetes⁴. It is unknown, however, whether fat mass is also associated with renal function in adolescents with type 1 diabetes.

Herein, we present data from a cohort of adolescents with type 1 diabetes (n=65, 57% female, 15±2 years, disease duration of 6.3±3.8 years, HbA1c 8.5±1.4%). Kidney function (estimated glomerular filtration rate - eGFR) was evaluated using both serum creatinine and serum cystatin C according to the Bouvet formula⁵ and albumin-to-creatinine ratio (ACR) was also measured. Fat mass was measured by Dual-energy X-ray absorptiometry (DEXA). Insulin sensitivity was measured by hyperinsulinemic-euglycemic clamp technique.

The mean eGFR and fat mass were respectively 100±20 mL/min/1.73m² and 16.2±8.1 kg, and median ACR was 7 (5-16) mg/g. Fat mass was positively associated with eGFR (β ±SE: 1.41±0.49, p=0.006, Figure 1), even after adjusting for body weight, insulin sensitivity and HbA1c (β ±SE: 1.24±0.46, p=0.01). Waist circumference (β ±SE: 0.44±0.19, p=0.02) and hip circumference (β ±SE: 0.42±0.16, p=0.01) were also associated with eGFR. Conversely, fat mass was not associated with ACR (data not shown).

These findings suggest a relationship between adiposity and renal function in adolescents with type 1 diabetes, and are also consistent with data from adults without diabetes². The mechanisms responsible for the positive association between adiposity and eGFR are, however, unclear. In type 1 diabetes, weight is related to glycemic control, since adolescents with poor glycemic control often experience weight loss, whereas tight glycemic control can lead to increased adiposity. As a consequence, the interaction between adiposity and GFR may in part be related to insulin regimens or more direct effects of ambient glycemia on renal hemodynamic function. Conversely, effects of fat mass on renal function have been associated with activation of neurohormonal, including the renin angiotensin system⁶, which promotes CKD. The relationship between fat mass and eGFR in adolescents with type 1 diabetes in our cohort is therefore not necessarily protective, since elevated GFR and renal hyperfiltration are manifestations of early diabetic kidney disease⁴. Therefore, longitudinal studies are required to evaluate whether fat mass in adolescents with type 1 diabetes is associated with renal hyperfiltration or preserved eGFR and ultimately CKD. For future directions, it will therefore be important to examine the relationships between fat mass and renal function over time in adolescents with and without type 1 diabetes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1. Association between fat mass and estimated GFR by Bouvet
P=0.002