Adipose Insulin Resistance Relates to Perturbed Renal Hemodynamics in Obese Youth with and without Type 2 Diabetes

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Objectives
- There is a need to better understand the pathophysiology of early intraglomerular hemodynamic dysfunction in youth with type 2 diabetes (T2D).
- The objective of this study was to compare adipose insulin sensitivity between obese youth with and without T2D and relate this measure to intraglomerular function.

Methods
- We assessed insulin sensitivity and intraglomerular hemodynamic function in obese youth with and without T2D.
- Gomez equations were used to calculate parameters of intraglomerular hemodynamic function.
- Statistical comparison was done using the nonparametric Mann Whitney test, and correlations were determined using nonparametric Spearman’s rho.

Results
- Free fatty acid (FFA) suppression was lower in youth with T2D compared to obese controls (55.6% vs. 92.1%, p<0.0001) (right), indicating adipose insulin resistance (IR).
- Impaired FFA suppression was associated with higher intraglomerular pressure, higher efferent arteriolar resistance, and higher renal vascular resistance (below).

Conclusion: Impaired FFA suppression was associated with perturbed renal hemodynamic parameters, indicating a potential role for adipose tissue IR in the development of early DKD. These findings may be explained by the fact that FFAs are a less efficient energy substrate for the kidneys compared to glucose -- with less ATP produced per oxygen consumed -- driving increased renal oxygen consumption and ultimately leading to oxidative damage and endothelial dysfunction.