Fibroblast Growth Factor 23 Is a Valuable Predictor of Autosomal Dominant Polycystic Kidney Disease Progression

To the Editor: We read the article "Prognostic Value of FGF23 in Autosomal Dominant Polycystic Kidney Disease" by El Ters and colleagues with great interest.[1] El Ters *et al*. provided an important demonstration that serum FGF23 was a prognostic biomarker for kidney volume and renal outcomes or death in patients with early ADPKD. However, early elevation of FGF23 in ADPKD is complicated and remains inconclusive. FGF23 is secreted primarily by the bone, followed by the thymus, heart, and other tissues in low levels. Experimental studies in PKD rodents revealed high FGF23 expression in the cyst-lining epithelium of kidneys but not in bone.[1] As kidney FGF23 does not contribute to the elevation of its circulating levels in uremia,[2] there may be other sources of high FGF23 in early ADPKD. Because ADPKD is a systemic disease, we assume that PKD mutations in different organs and tissues may produce FGF23 and lead to serum FGF23 elevation in humans. Indeed, severely polycystic livers were proved to produce and increase circulating FGF23 in ADPKD patients.[3] Overall, this study was very important, for it not only filled the gap by demonstrating what was not proved by the HALT-PKD Study which supported FGF23 use only in late ADPKD,[4] but also EI Ters et al. showed predictive roles of FGF23 in ADPKD progression independent of chronic kidney disease. More mechanisms about FGF23 elevation in ADPKD will need to be studied.

DISCLOSURE

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AUTHOR CONTRIBUTIONS

CX, LZ, and ZM drafted and revised the paper. All authors approved the submission.

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Response to "Fibroblast Growth Factor 23 Is a Valuable Predictor of Autosomal Dominant Polycystic Kidney Disease Progression"

The Author Replies: As noted by Xue *et al*., the source of the early elevation of circulating fibroblast growth factor 23 (FGF23) in autosomal dominant polycystic kidney disease remains uncertain. Although autosomal dominant polycystic kidney disease cyst

epithelium has been shown to express FGF23, the lack of contribution of renal FGF23 to circulating levels in uremic rats suggests that there may be extrarenal source(s). Bienaimé *et al*.[1] have reported that polycystic livers from patients with autosomal dominant polycystic kidney disease produce FGF23 and that the blood levels correlate with liver size. However, this was true only for the cleaved C-terminal fragment of FGF23, so the significance of this is unclear. Three studies, including ours, have now measured intact FGF23, using a 2-site enzyme-linked immunosorbent assay (either Kainos or Immutopics), and shown that it is unequivocally elevated.[2–4] Moreover, it is the intact form of FGF23 in the blood that is associated with progression of kidney volume growth and decline in glomerular filtration rate, as shown previously in the HALT study,[3] and now by us in CRISP.[4] More work is needed to unravel this fascinating puzzle, as well as to determine whether the association of FGF23 with outcomes represents a causal effect.

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