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Hyperuricemia in Children

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The prevalence of hyperuricemia has increased. Numerous epidemiological and animal studies have shown that hyperuricemia is related with chronic kidney disease (CKD) and hypertension. However, several confounding factors limit the interpretation of this relationship, and whether hyperuricemia directly causes decreased kidney function and elevated blood pressure remains unclear. Multiple pathological mechanisms support the idea that it contributes to kidney dysfunction. Urate crystals and uric acid–induced oxidative stress, upregulation of the renin-angiotensin system, and downregulation of nitric oxide production may contribute to the progression of kidney function. Despite these mechanisms, two large, well-designed studies failed to show that uric acid-lowering agents delay the progression of CKD. The KDIGO CKD Work Group recommends against the use of uric acid-lowering agents in patients with CKD and asymptomatic hyperuricemia. Nonetheless, the issue remains inconclusive. The role of uric acid may vary depending on the duration and severity of CKD, and in pediatric patients, who typically present with early and mild kidney disease, it may differ from that in adults. In addition to its association with CKD, the relationship between hyperuricemia and hypertension remains unclear. Clinical studies investigating the effects of urate-lowering therapy in adults have yielded mixed results: some have demonstrated a blood pressure–lowering effect, while others have found no such benefit. This association appears stronger in pediatric populations than in adults. This difference between adults and children may be explained by a two-stage process in which hyperuricemia raises blood pressure. In the early stage, known as the uric acid-dependent phase, increased serum uric acid levels cause vasoconstriction by reducing the activity of endothelial nitric oxide synthase and activating the renin-angiotensin-aldosterone system. Prolonged hyperuricemia eventually causes vascular structural changes that increase blood pressure. Once kidney damage has occurred, lowering serum uric acid levels becomes ineffective. Children typically have a shorter duration of hypertension, which may explain differences in the effectiveness of urate-lowering therapy. In children, the

role of uric acid in kidney function and blood pressure regulation is not yet fully understood and requires further investigation.

Keywords: Child, Chronic kidney disease, hypertension, Hyperuricemia, Uric acid