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Effect of hyperphosphatemia on gene expression of the Na-Pi cotransporter in rats

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ABSTRACT. We investigated the effect of high phosphorus content on the sodium-phosphate cotransporter (NaPi-IIa and NaPi-III). Forty-eight Sprague-Dawley rats were divided into 3 groups: high-phosphorus group (HP) with fructose diphosphate sodium injection; self-manufactured low-phosphorus diet group (LP); and normal diet group (NP). At the 1st, 2nd, 4th, and 6th weeks, 4 rats from each group were sacrificed for detecting serum levels of calcium, phosphorus, and intact parathyroid hormone. Semi-quantitative retrovirus-polymerase chain reaction was used to detect the expression of NaPi-IIa and NaPi-III mRNA in kidney. At the 1st, 2nd, 4th, and 6th weeks, serum phosphorus and parathyroid hormone levels in HP group were significantly higher than those in LP and NP groups ($P < 0.05$). Serum calcium levels in the 3 groups showed no difference ($P > 0.05$). Comparing the expression of NaPi-IIa mRNA in HP group with LP and NP groups, NaPi-IIa mRNA expression was significantly reduced in HP group ($P < 0.05$), while NaPi-IIa mRNA expression in LP group began

increasing at the 4th week ($P < 0.05$). At the 1st, 2nd, and 4th weeks, the expression of NaPi-III mRNA in HP, LP, and NP groups showed no clear differences ($P > 0.05$), while at the 6th week in HP group, NaPi-III mRNA expression was slightly increased compared to in LP and NP groups ($P < 0.05$). Hyperphosphatemia significantly affected NaPi-IIa and NaPi-III mRNA expression, and a factor promote an increase in intact parathyroid hormone independently of calcium.

Key words: Hyperphosphatemia; Kidney; Sodium-phosphate cotransporter

