GMR Genetics and Molecular Research
Online Journal
ISSN:1676-5680

Establishment and characterization of a rat model of hyperphosphatemia

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Genet. Mol. Res. 14 (3): 11089-11098 (2015)
Received February 17, 2015
Accepted June 29, 2015
Published September 22, 2015
DOI http://dx.doi.org/10.4238/2015.September.22.2

ABSTRACT. We established a rat model of hyperphosphatemia and investigated the systemic effects of high phosphorus (P). Sprague Dawley rats were randomly divided into high (HP), low (LP), and normal (NP) P groups (N = 12 each), which received injections of fructose diphosphate sodium, or were fed self-manufactured low phosphorus or normal diets, respectively. In each group, 4 rats were sacrificed at the first, third, and sixth week to detect the serum (Scr) and urinary creatinine and P, and calcium (Ca) levels. The HP group's serum P and intact parathyroid hormone (iPTH) were significantly higher than those in the other groups at the first, third, and sixth weeks, ($P < 0.05$); the LP group's serum P was lower than the NP group's at the third week ($P < 0.05$), while at the sixth week, the serum P and iPTH were lower ($P < 0.05$). No significant differences were detected for blood Ca^+ ($P > 0.05$). The HP group's Scr increased ($P < 0.01$), whereas the fractional excretion decreased ($P < 0.05$) significantly. Thighbone and lumbar spine bone densities differed significantly between groups

in the third week ($P < 0.05$); LP group densities were lower than NP group measures ($P < 0.05$). Crystallized stones were not observed microscopically following hematoxylin and eosin staining of the kidney. We successfully established a hyperphosphatemia rat model, and high blood P was found to significantly influence renal function and bone density. These results might provide a foundation to study the effects of hyperphosphatemia in rats.

Key words: Hyperphosphatemia; Model; Rat

