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Establishment of murine CKD-MBD model using adenine-rich diet

Ah-Yun Kim, Jiwon Kim, Gwan Yim, Weontae Kim, Wenjia Li, Tian Wang, **Kyung Pyo Kang**
Department of Internal Medicine-Nephrology, Chonbuk National University Medical School, Korea, Republic of

Objectives: End-stage renal disease has a 40% higher mortality rate one-year post-hip fracture than the general population. There is also a high prevalence of sarcopenia in chronic kidney disease. Therefore, we have questions about how to make a similar animal model comparable to human CKD-MBD. To address these problems, we establish the chronic kidney disease animal model using an adenine-rich diet in mice and evaluate bone density and microstructures by micro CT scan and histologic changes of bones and muscles.

Methods: Seven to eight-week-old male C57/BL6 mice were used in this experiment. We allocate two groups regular diet and an adenine-rich diet (0.25% adenine) for four weeks. We evaluated renal, bone, and muscle histology. We also evaluated a micro CT scan for trabecular and cortical bone density and microstructural changes.

Results: Four weeks of an adenine-rich diet, the body weight was decreased compared to the regular diet group. Histologically, tubulointerstitial areas have increased infiltration of inflammatory cells and fibrotic changes in the adenine-rich diet group. Cortical and trabecular bone shows an increase in cortical thinning and porosities in the adenine-rich diet group compared to the regular diet group. There is also a decrease in the perimeter of gastrocnemius muscles in the adenine-rich diet group.

Conclusions: Four weeks of an adenine-rich diet might lead to tubulointerstitial inflammation and fibrosis in the kidney. This model also induces bone and muscle changes, such as increased bone porosities, cortical thinning, and sarcopenia. This animal model might help to understand the pathophysiology of CKD-MBD.