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Effect of Dietary Mineral Sources and Oil Content on Calcium Utilization and Kidney Calcification in Female Fischer Rats Fed Low-Protein Diets.

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Summary

We studied the effects of dietary mineral source and oil intake on kidney calcification in 4-wk-old female Fischer rats after consuming the AIN-76 purified diet (AIN-76).

A modified AIN-76 mineral mixture was used, although the original calcium (Ca)/ phosphorus (P) molar ratio remained unchanged. Rats were fed the modified diets for a period of 40 d before their kidneys were removed on the last day. Ca balance tests were performed on days 31 to 36 and biochemical analysis of urine was also studied.

Kidney Ca, P, and magnesium (Mg) in the standard diet group (20% protein and 5% oil) were not affected by the mineral source. Kidney Ca, P, and Mg in the low protein, (10% protein) diet group, were found to be influenced by the dietary oil content and mineral source. In particular, the different mineral sources differentially increased kidney mineral accumulation. Pathological examination of the kidney showed that the degree of kidney calcification was proportional to the dietary oil content in the 10% dietary protein group, reflecting the calcium content of the kidney. The information gathered on mineral source in this study will help future researchers studying the influence of dietary Ca/P molar raios, and histological changes in the kidney.

生後 4 週齢の Fisher 系雌ラットを用いて AIN-76 精製飼料組成を基本とし、ミネラル給源、たんぱく質量及び脂肪量の違いが腎臓石灰化に与える影響について検討を行った。ミネラル給源は Ca/P モル比は変えずに Ca 給源と P 給源を変更したものを作成した。飼育期間は 40 日間とし、飼育開始 31 日から 36 日目に Ca 出納実験を行った。また、尿中の生化学検査や実験終了時に腎臓を摘出した。

腎臓中 Ca、P、並びに Mg 量は、標準食（20%たんぱく質、5%脂肪）摂取群においてミネラル給源による影響は認められなかった。10%たんぱく質摂取群において脂肪量とミネラル給源による影響がそれぞれ認められた。特に腎臓中 Ca、P、並びに Mg 量はミネラル給源の違いによって蓄積量が大きく増加していた。腎臓の病理観察では 10%たんぱく質摂取群では顕著な石灰化が脂肪量の増加に伴い観察され腎臓中のミネラル量を良く反映していた。

今後、飼料中の Ca/P モル比が腎臓中 Ca 量や組織変化にどのような影響を与えるかについて検討する事によって、Ca 代謝に影響する因子が明らかにできると考える。