The Pharmacological Effect and Mechanism of Lanthanum Hydroxide on Vascular Calcification Caused by Chronic Renal Failure Hyperphosphatemia

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Abstract

Background and Purpose: To investigate the treatment and mechanism of lanthanum hydroxide on hyperphosphate-induced vascular calcification in chronic renal failure. Experimental Approach: Develop a rat model of CKD hyperphosphatemia. Rats were randomly allocated to the model, lanthanum hydroxide, lanthanum carbonate, Calcium carbonate groups. Determination of serum biochemical indicators and the determination of pathological analysis of kidney tissue, Von Kossa staining and CT scan on the aortic vessels. The proteomic analysis of aortic tissue in Vivo. A calcified VSMCs model was established. The calcium content and ALP activity were measured. RT-PCR measures the mRNA expression level of SM22α, Runx2, BMP-2 and TRAF6. Western Blot measures the protein expression level of SM22α, Runx2, BMP-2, TRAF6 and NF-ϰB. Key Results: Through the detection of serum biochemical indicators and pathological analysis of kidney tissue, it can be summaryed that lanthanum hydroxide has the effect of delaying the progression of renal failure and protecting renal function. We found that the administration of lanthanum hydroxide delayed the development of vascular calcification induced by hyperphosphatemia in CKD. It can be concluded that lanthanum hydroxide may affect vascular calcification through the NF-ϰB pathway. In cultured VSMCs, treatment with Lanthanum chloride (LaCl3) blunted phosphate-induced calcification, osteo-/chondrogenic signaling, and NF-ϰB activation. Lanthanum hydroxide significantly reduces the expression of Runx2, BMP-2, TRAF6 and NF-ϰB. Conclusion and Implications: Lanthanum hydroxide has a protective effect on the kidneys, and can delay the development of vascular calcification by reducing serum phosphorus concentration. KEYWORDS: Lanthanum hydroxide, vascular calcification, chronic renal failure, hyperphosphatemia, pharmacological effect, mechanism

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