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The role of montelukast in hypertensive nephropathy

Eun Jin Bae[1], Jiwon Lee[2], Kyu hong Kim[2], SunHwa Lee[3], Jae Wook Lee[4], Dong Ki Kim[2], yon-su kim[2], seung-hee yang[2]
[1]Department of Internal Medicine-Nephrology, Gyeongsang National University Changwon Hospital, Korea, Republic of
[2]Department of Internal Medicine-Nephrology, Seoul National University Hospital, Korea, Republic of
[3]Department of Internal Medicine-Nephrology, Kangwon National University Hospital, Korea, Republic of
[4]Department of Internal Medicine-Nephrology, National Cancer Center, Korea, Republic of

Objectives : hypertension is one of the common chronic diseases and is closely related to cardiovascular disease and overall mortality and is the second cause of end-stage kidney disease. However, despite treatment for hypertension, only 48% are being treated appropriately. In our previous study, we confirmed that KLF2 up-regulation alleviates fibrosis and apoptosis of glomerular endothelial cells in hypertensive nephropathy. Montelukast is a leukotriene receptor 1 antagonist that not only has anti-inflammatory effects but is also known as a drug that causes KLF2 up-regulation. We aimed to confirm the function of montelukast to protect the kidneys through KLF2 regulation, anti-inflammatory, and anti-apoptotic effects in hypertensive nephropathy as well as asthma.
Methods : Using SHR, a hypertensive animal model, and WKY, a normotensive rat model that serves as the control group for SHR, montelukast was administered for 6 weeks from the date of uninephrectomy. After stopping the medication for 2 weeks, montelukast was administered again for another 2 weeks.
Results : In the SHR + nephrectomy model, a decrease in blood pressure (BP) was confirmed after administration of montelukast, which increased again after discontinuation of montelukast treatment. After re-administration, BP drops again. In the SHR + nephrectomy model, proteinuria was confirmed to be significantly reduced in the montelukast-administered group compared to the non-administered group (Urine protein/creatinine ratio: 2.4 g/g.cr in SHR + NP group, 1.68 g/g.cr in SHR + NP + ML group). The expression of KLF2 and cysleukotriene receptor were also significantly higher in the montelukast treated group compared to the non-treated group. The angiotensin II receptor type 1 expression was reduced in the montelukast treatment group.
Conclusions : Montelukast treatment not only lowers BP but also has a reno-protective effect by reducing proteinuria, which is associated with KLF2 up-regulation. Additional mechanistic research will be needed in the future.