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REDUCED EXPRESSION OF FXYD DOMAIN CONTAINING ION TRANSPORT REGULATOR 5 (FXYD5) IN ASSOCIATION WITH HYPERTENSION

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Background To investigate the expression of hypertension-related genes in spontaneous hypertension.

Methods A microarray screening for hypertension-related genes was conducted in rats with spontaneous hypertension (SHR) and rats with normotensive Wistar-Kyoto (WKY) using total RNA extracted from second-order mesenteric arteries and kidneys. Then the FXYD5 mRNA expression in vascular smooth muscle cells (VSMCs) was silenced by RNA interference (RNAi). Furthermore, the proliferation, mobility and Na⁺-K⁺-ATPase activity of cell were analysed.

Results Among 10,000 genes examined, the expression of human gene homolog FXYD domain containing ion transport regulator 5 (FXYD5) was found 14.8-fold lower in SHR than that in WKY rats ($p < 0.01$). The result of microarray assay was confirmed using quantitative real-time RT-PCR and Northern Blot. The altered FXYD5 gene expression occurred in a time- and tissue-dependent manner. The FXYD5 gene expression was highest in SHR's kidney at age of 13 weeks when the blood pressure reached the highest levels. The down-regulated FXYD5 inhibits the migration of smooth muscle cells ($p < 0.01$) and cell membrane Na⁺-K⁺-ATPase activity ($p < 0.01$).

Conclusions The down-regulation of FXYD5 is related to the migration of smooth muscle cells and cell membrane Na⁺-K⁺-ATPase activity in rodents. So this gene may have profound impact on the regulation of blood pressure, and therefore is likely to act as a potential target for anti-hypertensive therapy.