

## 항이노호르몬 신호전달시스템에서 microRNA 네트워크의 역할

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### MicroRNA Network Associated with Vasopressin Signaling: Identification of miRNAs Specific for AQPs Expression in the Collecting Duct Principal Cells

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MicroRNA (miRNA), a small fragment RNA (~22 nucleotides) produced from non-coding region of the expressed RNA, has been demonstrated to be a critical regulator in post-transcriptional regulation for protein expression. However, identification of collecting duct AQPs-targeting miRNAs and vasopressin-responsive miRNAs in the collecting ducts have not been demonstrated. To profile miRNAs in the kidney collecting ducts, microarray chip assay (Affymetrix GeneChip® miRNA 3.0 Array) was done in the tubule suspension of inner medullary collecting duct (IMCD) of rat kidney in the absence or the presence of dDAVP stimulation (10 nM, 2 h). Fifteen mature miRNAs showing 1.3-fold changes ( $p < 0.05$ ) were identified as dDAVP-responsive miRNAs. Collecting duct AQPs-targeting miRNAs were selected by in silico target prediction analysis using TargetScan 6.2. Four miRNAs (miR-32, miR-137, miR-216a, and miR-216b-5p) for AQP2, one miRNA (miR-194) for AQP3, two miRNAs (miR-148b-3p and miR-152) for AQP4 were predicted. In silico target prediction analysis using mouse miRNA database also exhibited that miR-137 and miR-32 target AQP2 mRNA. To quantitate the dDAVP-dependent changes of expression of collecting duct AQPs-targeting miRNAs, RT-qPCR analysis was performed. Moreover, prediction analysis to identify target proteins of miRNA involved in the vasopressin-mediated signaling pathways was done using DIANA-mirPath. The results demonstrated that miR-137 and miR-32 could target mRNAs involved vasopressin-mediated signaling, such as MAPK signaling, calcium signaling, phosphatidylinositol signaling, and mTOR signaling. Taken together, we identified several potential collecting duct AQPs-targeting miRNAs and demonstrated the changes of vasopressin-responsive miRNAs expression. Further studies are undertaken to confirm their specificity to AQP2, AQP3, and AQP4, and to examine as to whether regulation of miRNAs specific to collecting duct AQPs could be used to treat water balance disorders.

**Key Words:** 마이크로RNA, 수분통로단백, 항이노호르몬 신호전달

MicroRNA, Aquaporin, Vasopressin signaling