Notch Signaling Pathway in High Glucose Induced Mitochondrial Oxidative Damage and Apoptosis in Renal Tubular Epithelial Cells and Its Possible Mechanism

Ying Zhang, JiaLi Wei, XiaoHong Yang, YanNi Wang, Yan Su, MaoWei Xie
Department of Department of Nephrology, Hainan General Hospital, China

Objectives: Diabetic nephropathy (DN) is the most common and most serious chronic microvascular complication in diabetes. Recent researches have indicated that Notch pathway can mediate the impairment of glomerular and renal tubular function, and promote renal interstitial fibrosis and angiogenesis. Given this background, we explored the effects of Notch signaling pathway in high glucose induced mitochondrial oxidative damage and apoptosis in renal tubular epithelial cells and its possible mechanism.

Methods: Protein and mRNA expressions were detected by Western blot and Real-time PCR, respectively.

Results: High glucose up-regulated the protein expressions of Jagged1, Notch1, pro-caspase-3, Drp1, and PGC-1α, and DAPT reversed such effects. Meanwhile, DAPT antagonized the mRNA expressions of Jagged1, Notch1, MnSOD2, Drp1, and PGC-1α induced by high glucose.

Conclusions: These data indicated that Notch signal pathway may regulate high glucose-induced oxidative damage and apoptosis in renal tubular epithelial cells by regulating mitochondrial dynein and biogenesis genes, thereby accelerating the interstitial fibrosis of DN. Notch signaling pathway might be a therapeutic target for DN mitochondrial oxidative damage and apoptosis.

High glucose up-regulated the expressions of Drp1(A) and PGC-1α (B) mRNA and protein, DAPT antagonized the expression of high glucose induced Drp1 and PGC-1α mRNA and protein expression.