

# Comparison Of In Vitro Models Of Diabetic Nephropathy Using Renal Tubular Cells

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## **Abstract**

**Background:** Diabetic nephropathy (DN) is a chronic and serious complication associated with diabetes. The standardization of an in vitro model to best represent DN is very challenging due to the chronic nature of the condition. Therefore, two different renal tubule cell lines - Madin-Darby canine kidney cells (MDCK) and Normal rat kidney cells (NRK-52E) - were used to investigate the effects of high glucose on kidney cells. **Objective:** To determine the effects of high glucose concentrations on cell viability (using MTT assay), oxidative stress (using dichlorofluorescein (DCF) staining), and expression of proteins activated in DN such as aldose reductase and glucose-regulated protein-78 (GRP78), an endoplasmic reticulum chaperone (using western blotting). **Results:** MDCK cells showed a subtle decrease in viability when exposed to high glucose concentrations (30 mM and 1% FBS) for 48 h. Furthermore, there was a slight increase in aldose reductase expression after 48 h of high glucose exposure, however; the GRP78 levels remained unchanged. NRK-52E cells showed more consistent decrease in viability after 48 and 72 h of high glucose exposure (30 mM and 1% FBS). In addition, the DCF staining also demonstrated an increase in oxidative stress after 24 h of high glucose exposure. Furthermore, a 30% increase in aldose reductase expression has been observed after 48 h of high glucose exposure. **Conclusion:** Although the 48 h high glucose exposure in MDCK cells can be used as a model for in vitro DN, the results are less reproducible, whereas NRK-52E cells seem to be a better and more reliable cell line to mimic the features of DN in vitro.

**Key words:** Diabetic nephropathy; In vitro; Kidney; Oxidative Stress; ER Stress.