

## Original Paper

# Characteristics of hepatocyte rough endoplasmic reticulum single cationic channel in Streptozocin- induced diabetic Rats

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## Abstract

**Background and Objective:** The role of ion channels and particularly cationic channels in the pathogenesis of various diseases are being considered carefully. The diabetes mellitus is a common disease which is initiated by ion channel disturbances. This study was done to determine the characteristics of hepatocyte rough endoplasmic reticulum single cationic channel in Streptozocin- induced diabetic rats.

**Materials and Methods:** This experimental study was done on 10 male adult Wistar rats and animals were randomly allocated into diabetic and control groups. Diabetes induced by STZ (65 mg/kg/bw) intraperitoneally. Rough endoplasmic reticulum vesicles were extracted following rat liver excision, homogenization and ultracentrifuging. The bilayer membrane formation was prepared by painting phosphatidylcholine on 250 $\mu$ M aperture in between Cis and Trans sides. The RER vesicles incorporation was performed through gentle and delicate touch of membrane using a dentistry needle. The Pclamp9 software was used for ion channel activity characteristic analysis.

**Results:** The cationic channel current amplitude did not change significantly in voltages more than +30 mV but their open probability ( $P_o$ ) decreased in diabetic group ( $P<0.05$ ). More severe changes in channel activity were seen in potentials less than the reverse potential. In addition to significant increase of channel  $P_o$  ( $P<0.05$ ), also, the channel unitary currents were significantly decreased ( $P<0.05$ ). The mean current amplitude and channel open probability in voltage +40 mV were  $17\pm 2.14$  pA and  $0.68\pm 0.01$  in control group respectively, whereas, the values of these parameters reached to  $18.5\pm 2.5$  and  $0.26\pm 0.03$ , respectively. In voltage -10 mV, the values of mean current amplitude and  $P_o$  were  $-22.3\pm 2.14$  pA and  $<0.1$  in control group, respectively but the values changed to  $-13.1\pm 0.08$  and  $0.62\pm 0.03$  in diabetic group.

**Conclusion:** It seems that RER cationic channel is involved in metabolic changes which cause by diabetes mellitus and this disease can cause probably a channel gating kinetic and behavior change by inducing metabolic stresses.

**Keywords:** Endoplasmic Reticulum, Cationic Channel, Single Channel Recording, Bilayer Lipid Membrane, Diabetes mellitus

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