

ENDOTHELIAL CELLS FROM NEWBORNS WITH A STRONG FAMILY HISTORY OF TYPE 2 DIABETES SHOWED A DEFICIENT SYNTHESIS OF NO AND ROS IN HIGH GLUCOSE CONCENTRATIONS

N. Alvarado-Vasquez¹, E. Zapata², F. Masso², A. Paez²,
S. Alcazar-Leyva³, L.F. Montañó⁴

¹Departamento De Bioquímica, Instituto Nacional De Enfermedades Respiratorias, ²Departamento De Biología Celular, Instituto Nacional De Cardiología Ignacio Chavez, Mexico DF, ³Instituto De Investigaciones Científicas Hans-Selye, A.C., Queretaro, Qro, ⁴Laboratorio De Inmunología, Departamento De Bioquímica, Facultad De Medicina UNAM, Mexico DF, Mexico

Background: A family history of type 2 diabetes mellitus (FH-DM2) increases the possibility to develop endothelial dysfunction and DM. The probably mechanism involves a nitric oxide (NO) and reactive oxygen species (ROS) synthesis, which depends on the adequate mitochondrial activity. For the above mentioned we evaluated the NO and ROS synthesis in Human Umbilical Vein Endothelial Cells (HUVECs) obtained from healthy newborns with (experimental) and without (control) a FH-DM2. **Methods:** Were evaluated cell proliferation, mitochondrial activity, and mitochondrial membrane potential. Intracellular NO and ROS synthesis were evaluated in the presence of the uncoupler CCCP, cytochalasin B, or DPI after incubation with supraphysiological glucose concentrations. Expression of eNOS, GLUT1 and p53 transcripts was also determined by RT-PCR. **Results:** Experimental HUVECs showed a reduced intracellular nitric oxide synthesis, opposite to control HUVECs (P<0.05). Experimental HUVECs exposed to 30 mmol/L glucose showed a 50% decrease in cell proliferation, a 80-90% reduction in mitochondrial activity, and a significant inhibition of ROS synthesis in the presence of CCCP or cytochalasin B. There was a diminished expression of eNOS and p53 transcripts, and an enhanced expression of GLUT1 transcripts in experimental HUVECs vs control HUVECs (P<0.05). **Conclusions:** Our results show that mitochondria and NAD(P)H-oxidase from HUVECs obtained from healthy newborns with a FH-DM2 have an impaired response to high glucose concentrations. Moreover, the inadequate intracellular synthesis of NO by experimental HUVECs, probably derived from an innate deficient energetic metabolism, might be the cause of the early endothelial dysfunction observed in individuals with a strong FH-DM2.