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NEUROPEPTIDE Y DISRUPTS REDOX BALANCE IN HUMAN EXTRAVILLOUS TROPHOBLASTS

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Human extravillous trophoblasts play a key role in implantation, placentation, and successful pregnancy outcomes due to their ability to migrate and invade through the uterine spiral arteries. Abnormalities in the trophoblasts' migratory and invasive abilities may result in insufficient remodeling of the uterine spiral arteries. This leads to the development of preeclampsia, a syndrome in pregnancy. Neuropeptide Y (NPY) is a sympathetic neurotransmitter that plays a significant role in the adaptive stress response as well as in the regulation of body energy balance. This study was designed with the aim of investigating whether preeclampsia is associated with NPY-induced disruption of trophoblast migration and redox balance. For this purpose, the concentration of NPY was determined in the plasma of 20 healthy and 20 preeclamptic pregnant women. The obtained results demonstrated that in preeclampsia, the concentration of NPY is significantly lower (190 pg/mL) than in a healthy pregnancy (260 pg/mL). After that, NPY in concentrations of 190 pg/mL and 260 pg/mL was used to treat the human extravillous trophoblast cell line HTR-8/SVneo for ten weeks. The effect of NPY on trophoblast proliferation was determined by counting cells during each passage. After the end of the treatment, the effect of NPY on migration and intracellular concentrations of superoxide anion radical ($O_2^{\cdot-}$), hydrogen peroxide (H_2O_2), and nitric oxide (NO) were examined. The obtained results show that NPY induces changes in trophoblast proliferation and reduces their migration at both applied doses. In addition, both doses of NPY induce a decrease in intracellular concentrations of $O_2^{\cdot-}$, H_2O_2 , and NO. The NPY concentration of 190 pg/mL significantly decreased $O_2^{\cdot-}$ in trophoblasts in comparison to the concentration of 260 pg/mL. This study demonstrates that NPY affects the migration and redox balance regulation of trophoblasts. It also disrupts the trophoblast redox balance at a level characteristic of preeclamptic pregnancy.