ABSTRACT

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Catecholamines norepinephrine and dopamine have been implicated in numerous physiological processes within the central nervous system. Emerging evidence suggests their involvement in placental development and functions and a crucial role in fetal development and programming. Nonetheless, a comprehensive characterization of catecholamine synthesis, degradation, and transport in the fetoplacental unit is still lacking. Thus, in this thesis, we aimed to provide a comprehensive evaluation of catecholamine metabolism and transport in the fetoplacental unit. Gene and protein expression was evaluated using quantitative polymerase chain reaction (PCR) and Western blot analysis, respectively. Firstly, using several placental cell models (BeWo, JEG-3, primary trophoblast cells), we identified components of cellular catecholamine handling associated with the trophoblast cells. Next, we determined the effect of advancing gestation on the placental catecholamine system in humans (first trimester vs. term placenta) and rats (gestation day 15, 18, and 21). Lastly, we addressed the expression of catecholamine pathway in rat fetal organs (brain, intestine, liver, lungs, kidneys, and heart) from mid-to-late gestation. Collectively, we suggest that during pregnancy, regulatory pathways control levels of norepinephrine and dopamine in the fetoplacental unit to ensure proper embryo and fetal development throughout gestation.