ABSTRACT

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Title of the diploma thesis: Precision-cut placental slices as a model to study inflammatory response.

Maternal inflammation during pregnancy is a recognized factor linked to an array of complications and potential neurodevelopmental and neuropsychiatric risks for offspring. Placenta isthe crucial interface between maternal and fetal domains. This organ not only shapes fetal development but also possesses the ability to respond to inflammatory stimulations, potentially in a sex-specific manner. Nonetheless, the fundamental immunoregulatory mechanisms orchestrating such responses remain unclear. To bridge this knowledge gap, our study harnessed an innovative approach: the ex vivo precision-cut placental slice model using rat placentas. This experimental design was tailored to probe acute inflammatory responses. Precision-cut placental slices, precisely 200 µm thick, were meticulously generated from both male and female rat placentas. These slices were subjected to varying concentrations of Lipopolysaccharide (LPS) or Polyinosinic: polycytidylic acid (Poly I:C) for discrete periods of 4 and 18 hours. Our investigative journey uncovered compelling revelations: LPS stimulation triggered a robust upswing in the expression and subsequent release of proinflammatory cytokines, specifically Tumor necrosis factor α (TNF-α), Interleukin 6 (IL-6), and Interleukin 1β (IL-1β). In stark contrast, Poly I:C exposure elicited a more subdued inflammatory reaction. A remarkable twist emerged as the female placenta, when challenged by LPS, unveiled heightened sensitivity compared to its male counterpart. In summary, in this diploma thesis we introduce the rat placental slices as an avant-garde experimental model, effectively unlocking the realm of sexual dimorphism within acute inflammatory responses and immune activity

during pregnancy. Within this model, there is the potential to unravel the complex interactions connecting maternal inflammation, placental functionality, and fetal outcomes, thereby casting light upon prospective therapeutic pathways.