

## The Functionality of Ovarian Follicle on Steroid Hormone Secretion under Heat Stress

**Authors :** Petnamnueng Dettipponpong, Shuen E. Chen

**Abstract :** Heat stress is known to have negative effects on reproductive functions, such as follicular development and ovulation. This study aimed to investigate the specific effects of heat stress on steroid hormone secretion of ovarian follicle cells, particularly in relation to the expression of Apolipoprotein B (ApoB) and microsomal triglyceride transfer protein (MTP). The aim of the study was to understand the impact of heat stress on steroid hormone secretion in ovarian follicle cells and to explore the role of ApoB and MTP in this process. Primary granulosa and theca cells were collected from follicles and cultured under heat stress conditions (42 °C) for various time periods. Controls were maintained under normal conditions (37.5 °C ). The culture medium was collected at different time points to measure levels of progesterone and estradiol using ELISA kits. ApoB and MTP expression levels were analyzed using homemade antibodies and western blot. Data were assessed by a one-way ANOVA comparison test with Duncan's new multiple-range test. Results were expressed as mean±S.E. Difference was considered significant at P<0.05. The results showed that heat stress significantly increased progesterone secretion in granulosa cells, with the peak observed after 13 hours of recovery under thermoneutral conditions. Estradiol secretion by theca cells was not affected. Heat stress also had a significant negative effect on granulosa cell viability. Additionally, the expression of ApoB and MTP was found to be differentially regulated by heat stress. ApoB expression in theca cells was transiently promoted, while ApoB expression in granulosa cells was consistently suppressed. MTP expression increased after 5 hours of recovery in both cell types. These findings suggest a mechanism by which chicken follicle cells export cellular lipids as very low-density lipoprotein (VLDL) in response to thermal stress. These contribute to our understanding of the role of ApoB and MTP steroidogenesis and lipid metabolism under heat stress conditions. The study involved the collection of primary granulosa and theca cells, culture under different temperature conditions, and analysis of the culture medium for hormone levels using ELISA kits. ApoB and MTP expression levels were assessed using homemade antibodies and western blot. This study aimed to address the effects of heat stress on steroid hormone secretion in ovarian follicle cells, as well as the role of ApoB and MTP in this process. The study demonstrates that heat stress stimulates steroidogenesis in granulosa cells, affecting progesterone secretion. ApoB and MTP expression were found to be differentially regulated by heat stress, indicating a potential mechanism for the export of cellular lipids in response to thermal stress.

**Keywords :** heat stress, granulosa cells, theca cells, steroidogenesis, chicken, apolipoprotein B, microsomal triglyceride transfer protein

**Conference Title :** ICASV 2024 : International Conference on Animal Sciences and Veterinary

**Conference Location :** Taipei, Taiwan

**Conference Dates :** March 04-05, 2024