

## 学位論文発表会

# Study on mitochondria functions in granulosa cells during follicular development process



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The number of quality oocytes is essential for both in vitro and in vivo embryo development, which is dependent on the successful follicular development. Proliferation and differentiation of granulosa cells (GCs) are crucial during the follicular development process. In this study, mitochondria functions in GCs were investigated. It was observed that the mitochondrial gene expression and protein turnover were critical for inducing mitochondrial activity and ATP production required for GCs proliferation. However, ROS generation is natural as a by-product of mitochondrial ATP production. Although FSH is considered as a survival factor for GCs and follicle, in this study, a considerable amount of ROS generation in GCs was observed during FSH-induced follicular development process. Consequently, mitochondrial DNA damage, reduced mitochondrial activity and ATP production were observed that reduced the GCs survivability and induced follicular atresia. Hopefully, mitochondria-specific antioxidant (PQQ) treatment not only recovered these negative effects but also improved GCs physiology, follicular health, number of quality oocytes and female fertility. This is a new story which will contribute new insights and understanding to the cell and ovarian biology. Moreover, these results will be useful not only for the development of assisted reproductive techniques (ARTs) in female animal reproduction but also in the field of clinical biotechnology regarding woman infertility.

体外受精の成績向上(挙児率を高める)には、発生する能力の高い成熟卵をたくさん集める必要があります。これには正常に発育する卵胞数を増加させる必要があります。本研究では、卵胞発育期における顆粒膜細胞の増殖について、ミトコンドリアのATP合成と活性酸素の産生に焦点を当て、ミトコンドリアにおけるミトコンドリアDNAの増幅、ミトコンドリア特異的転写因子とRNA合成酵素の発現が亢進するが、それらが活性酸素の標的になることを明らかとしました。さらに、ミトコンドリア内の活性酸素を除去することで、多数の成熟卵を得ることに成功しました。また、この成果から、卵胞閉鎖と活性酸素との関係を解明しました。

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本講演は、生物圏科学研究科の大学院セミナーの単位になります。