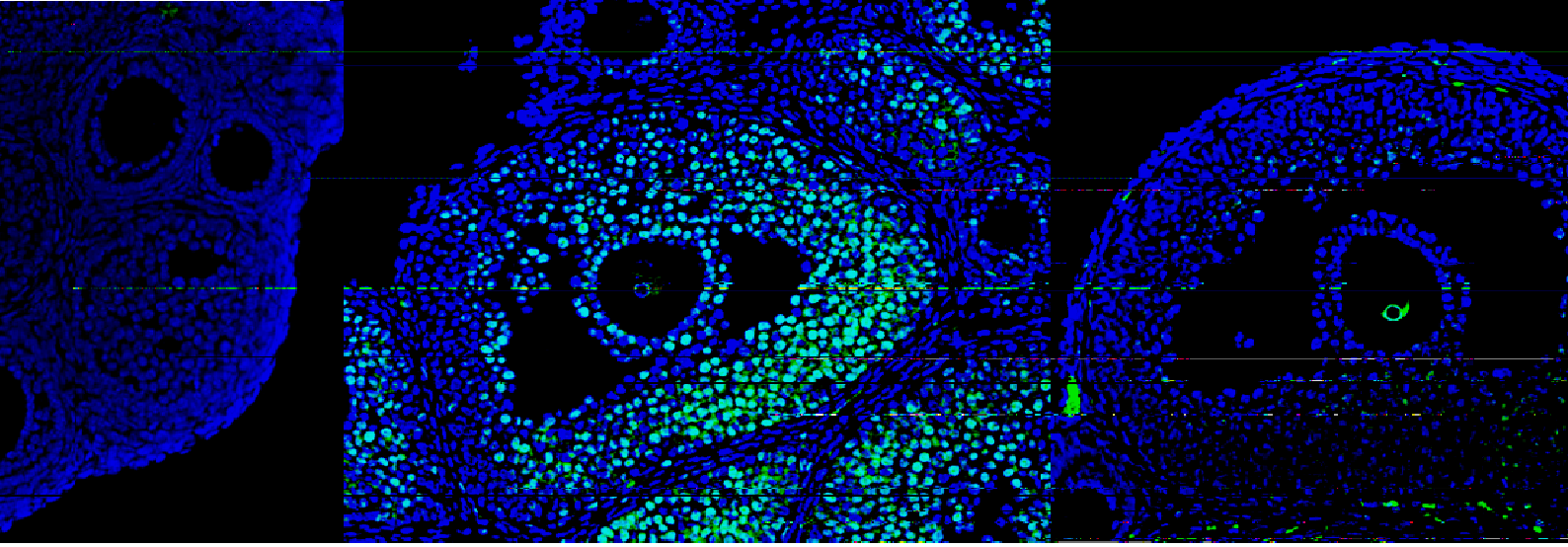

The number of quality oocytes is essential for both in vitro and in vivo embryo development, which is dependent on the successful follicular development. Proliferation and differentiation of granulosa cells (GCs) are crucial during the follicular development process. In this study, mitochondria functions 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.

ATP

DNA RNA

7899 mashimad@hiroshima-u.ac.jp