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Antioxidant capacity of melatonin on morphological and molecular aspects of fresh and vitrified pre-implantation rabbit embryos

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Embryo cryopreservation remains an important technique to enhance the reconstitution and distribution of animal populations with high genetic merit. One of the major detrimental factors to this technique is the damage caused by oxidative stress. Melatonin is widely known as an antioxidant with multi-faceted ways to counteract the oxidative stress. This study was carried out to investigate the role of melatonin in protecting rabbit embryos during pre-implantation development from the potential harmful effects of oxidative stress induced by *in vitro* culture or vitrification. The data showed that melatonin promoted the blastocyst rate in both fresh and vitrified rabbit embryos. The activity of antioxidant enzymes such as glutathione S-transferase and superoxide dismutase significantly increased by the treatment of melatonin in fresh or vitrified embryos, while the levels of produced oxidative substrates such as lipid peroxidation and nitric oxide decreased ($P<0.05$). Additionally, melatonin considerably stimulated the relative expression of oxidative-stress-response-related genes (*NFE2L2* and *SOD1*) and developmental-related-genes (*GJA1* and *Nanog*) in both fresh and vitrified embryos. Furthermore, melatonin significantly ameliorated the reduction of developmental-*POU5F1* and antioxidant-*GPX1* gene expression induced by vitrification. The results obtained from the current investigation provide new and clear molecular aspects regarding the mechanisms by which melatonin promotes development of both fresh and vitrified rabbit embryos.

Biography

Gamal Mohamed Kamel Mehaisen has received his PhD from Polytechnic University of Valencia, Spain. He is now an Associate Professor of Poultry Physiology at Animal Production Department, Faculty of Agriculture, Cairo University, Egypt. He got his BSc degree in Agricultural Science 1991, MSc in Poultry Production 1997 from Cairo University and Diploma in Animal Production from Mediterranean Agronomic Institute of Zaragoza - IAMZ (CIHEAM), Spain. He has published 6 papers in international journals and more than 10 publications in reputed local journals. His area of research interest focuses on improving the methods and results of semen and embryo vitrification protocols using the rabbit as animal model.

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