Public Abstract
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Title:INVOLVEMENT OF MITOCHONDRIAL TRANSCRIPTION FACTOR (TFAM) IN PORCINE GAMETOGENESIS AND PREIMPLANTATION EMBRYO DEVELOPMENT

Mitochondria are cells' power stations producing energy for cell sustenance and multiplication. Mitochondria carry their own unique genes that are separate from genes encoded by nuclear chromosomes. TFAM is a protein encoded by a nuclear gene that binds directly to select mitochondrial genes to control the renewal and multiplication of mitochondria. Mouse embryos with mutated TFAM gene die. We examined the distribution of TFAM protein in the sperm cells, eggs, and embryos of domestic pig, a livestock species of great agricultural importance. As the porcine ovum matures in preparation for fertilization by increasing the number of its mitochondria, TFAM protein is produced and accumulated in its cytoplasm and mitochondria. When fertilization takes place, the amount of TFAM protein in the new embryo is drastically reduced, possibly to prevent overproduction of mitochondria during early development. TFAM is surprisingly found in the area of boar sperm tail free of mitochondria. Furthermore, the residues of TFAM protein found in the sperm tail appear to be marked for degradation with a protein-recycling molecule ubiquitin. Removal of TFAM may facilitate the destruction of paternal, sperm-contributed mitochondria at fertilization, a normal event in mammals. TFAM may have critical roles for maturation of porcine sex cells and embryo development. By understanding the function of TFAM protein, we hope to devise new strategies to reduce early pregnancy loss causing reduced litter sizes and substantial financial loses to pork industry. Technologies such as pig cloning and embryo transfer could be improved by managing TFAM function.