

Proteomics Analysis of the Extraembryonic Tissue from Cloned Porcine Embryos

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Cloned animals developed from the somatic cell nuclear transfer (SCNT) embryos are useful resources for agricultural and medical applications. However, the birth rate in the cloned animals is very low and the cloned animals that have survived show various developmental defects. In this report, we present the morphology and differentially regulated proteins in the extraembryonic tissue from SCNT embryos to understand the molecular nature of the tissue. We examined 26 day old SCNT porcine embryos at which the sonogram can first detect pregnancy. The extraembryonic tissue from SCNT embryos was abnormally small compared to the control. In the proteomic analysis with the SCNT extraembryonic tissue, 39 proteins were identified as the differentially regulated proteins. Among up-regulated proteins, Annexins and Hsp27 were found. They are closely related to the processes of apoptosis. Among down-regulated proteins, Peroxiredoxins and anaerobic glycolytic enzymes were identified. In the Western blot analysis, anti-oxidant enzymes and the anti-apoptotic Bcl-2 protein were down-regulated, and caspases were up-regulated. In the TUNEL assay with the placenta from SCNT embryos, apoptotic trophoblasts were observed. These results demonstrate that a major reason for the low birth rate of cloned animals is due to the abnormal apoptosis in the extraembryonic tissue during early pregnancy.