Identification of bovine IVF embryos without chromosome abnormalities by live-cell imaging

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In vitro fertilized (IVF) embryo transfer has become an important innovation in the agricultural sectors, such as in cattle production. Approximately half of all bovine embryos produced worldwide were derived from IVF. However, the pregnancy success rate of IVF embryos transplanted into recipients remains low. To increase the success of pregnancy, key technological issues affecting the in vitro production of embryos and the assessment of viable embryos must be addressed. This is also true for human artificial reproductive technology (ART). Generally, assessment of bovine embryo quality is performed by morphological grading on days 7 to 8 post-insemination, as recommended by the International Embryo Technology Society (IETS), but the pregnancy success rate of embryos judged as transferable is only 30 percent to 50 percent. Therefore, novel technology for noninvasively and reliably selecting viable IVF embryos has been craving.

Research groups of Dr. Satoshi Sugimura (Tokyo University of Agriculture and Technology), Dr. Kazuo Yamagata (Kindai University), Mr. Tatsuma Yao (FUSO Pharmaceutical Industries, Ltd.), and Dr. Satoko Matoba (NARO), now report in the journal *Scientific Reports*, that successful nonvisible selection of bovine IVF embryos without chromosomal abnormalities by long term "live cell imaging" with fluorescence confocal microscopy. The chromosomal abnormality was detected by injection of mRNA encoding histone H2B-mCherry and EGFP-α-tubulin.

The live-cell imaging revealed that about half of embryos judged as morphologically transferable by IETS criteria had nuclear/chromosomal abnormalities, such as abnormal number of pronuclei and abnormal chromosome segregation, which may lead abortion. All of two recipients transferred the embryos without any nuclear/chromosomal abnormalities got pregnant. It should be expected to improve the pregnancy success by selecting bovine IVF embryos with the live-cell imaging.

More information: Tatsuma Yao et al, Live-cell imaging of nuclear–chromosomal dynamics in bovine in vitro fertilised embryos, *Scientific Reports* (2018). DOI: 10.1038/s41598-018-25698-w

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