Melatonin increases the number of trophectoderm cells and total embryonic cells in in vitro-derived bovine blastocysts

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In humans, early pregnancy loss, pre-term delivery and multiple pregnancies resulting after application of assisted reproductive technologies, such in vitro-embryo (IVF) production could have their origins, in part, to deficiencies in the preimplantation embryo health. It has been shown that IVF embryos have fewer trophectodermal (TE) cells than in vivo-derived embryos. The TE cells are important for attachment of the embryo to the uterine endometrium, the formation of the fetal placenta and ultimately pregnancy establishment. An aberrant allocation of inner cell mass (ICM) and TE cells could be related to insufficient placentation and thus embryonic/fetal losses. Excess of oxidative stress under IVF conditions can alter many important reactions affecting the embryonic development. In the present study, we investigated the effects of melatonin on allocation of ICM and TE cells in in vitro-derived bovine embryos. These data indicate that the presence of melatonin in in vitro embryo production media increases the allocation of embryonic to the trophectoderm, as well the total number of embryonic cells. The physiological importance of this finding warrants further study and could have an important implication to reduce early embryo/fetal losses observed after in vitro embryo production.

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