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Hypodiploidy as a prominent attributor to chromosomal aneuploidy in transgenic rabbit embryos

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Transgenic animals play a vital role in basic research, agriculture and pharmaceutical industries. Rabbits have the advantage of other large laboratory species in that they have a short gestation period and yield large numbers of embryos. Production of transgenic rabbits has been directed towards using the rabbit as a model for large domestic animals or as a basic biological model for studying the mammalian gene regulation. In connection with their use, developmental and health disorders have also been reported in genetically modified animals. Random integration of a transgene can disrupt the function or regulation of an endogenous gene, resulting in insertion mutations or chromosomal aneuploidy. Chromosomal abnormalities affect the developmental potential of early embryos and serve as potential predictors of developmental outcome. This study was aimed at analyzing the cytogenetic profile of transgenic rabbit embryos, which is necessary for selecting optimal lines for dissemination in order to eliminate animals with chromosomal aberrations. Conventional Giemsa stained c-metaphase spreads obtained from blastomeres of intact as well as microinjected transgenic (EGFP and hFVIII) and non-transgenic embryos revealed a significantly higher ($P < 0.01$) rate of aneuploid cells in transgenic rabbits compared to non-transgenic animals. However, microinjection did not seem to influence the rate of aneuploidy, as the incidence of aneuploidy in non-transgenic blastomeres was significantly lower ($P < 0.01$) in comparison with intact ones (14.3 vs. 73.33%). The findings suggest hypodiploidy as the prominent attributor to the occurrence of aneuploidy. This is the first report of 100% chromosomal aneuploidy in the embryos of both EGFP and hFVIII transgenic rabbits.

Keywords:

chromosomal aneuploidy; EGFP; embryo; hFVIII; rabbit; transgenic

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