BRC Current Technology
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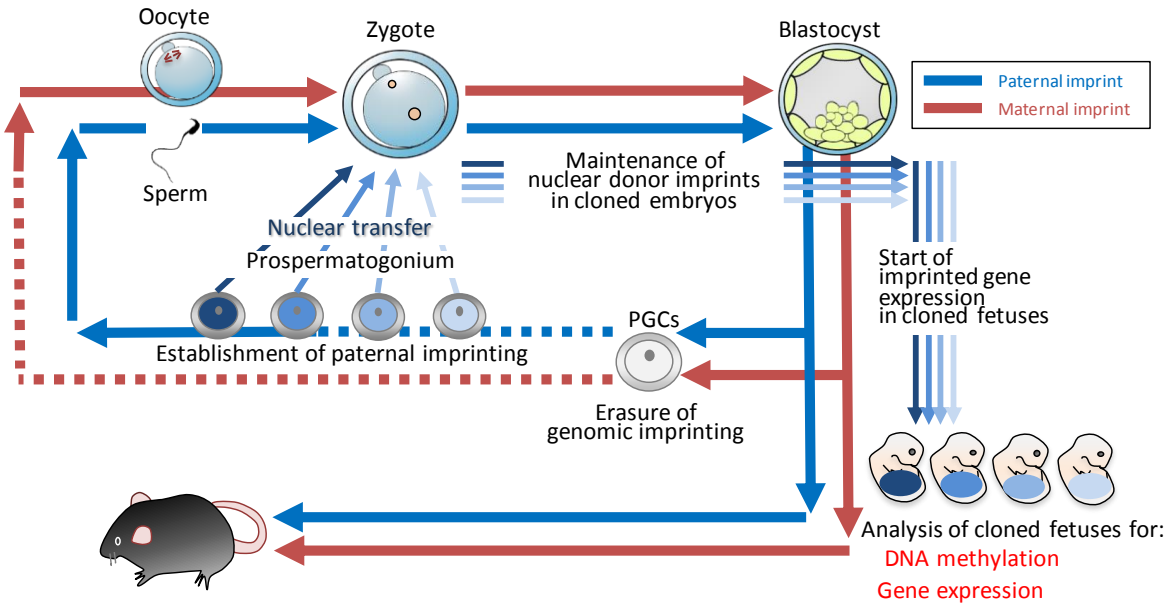
9. Nuclear transfer from germ cells
For the study of developmental epigenetics



Somatic cell nuclear transfer into enucleated oocytes is a technique for generating 'cloned' embryos carrying the genomic information of the donor cells. Following nuclear transfer, the donor genome undergoes genome-wide reprogramming to acquire totipotency: the genomic state equivalent to that of fertilized oocytes. However, certain epigenetic memories imposed during germ cell development, such as those regulating parental origin-specific genes (i.e., genomic imprinting), are not reprogrammed but are inherited by the reconstructed embryos. Using germ cells selected at different stages of development as nuclear donors, we have been able to produce embryos/fetuses in which the imprinted memories of the donor germ cell genome persist. This approach has allowed us to obtain systematic information on gene expression as well as on DNA methylation patterns of multiple genes within a single genome. The information thus obtained might provide clues to better understanding of how erasure of imprinting occurs in early primordial germ cells, how paternal imprinting is established in prospermatogonia, and how imprinted X chromosome inactivation is established in growing oocytes. Besides its practical use for cloning animals, nuclear transfer from germ cells can be a unique tool for analyzing epigenetic dynamics during development.

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[3] Oikawa M, Inoue K, Shiura H, Matoba S, Kamimura S, Hirose M, Mekada K, Yoshiki A, Tanaka S, Abe K, Ishino F, Ogura A. Epigenetics 9:204-211, 2014.