Abstract

Mutant mice are crucial tools for understanding gene functions *in vivo*. Recently, generation of mouse mutants was revolutionized by rapid developement of programmable nucleases, predominantly by the CRISPR/Cas9 system. Genome editing based on introduction of CRISPR/Cas9 components into early stage mouse embyros allows fast and inexpensive generation of gene-deficient animal models, especially when compared to the traditional techniques based on modification of embryonic stem cells (ESCs). The ability of CRISPR/Cas9 to induce double-strand break (DSB) at a given location of genomic DNA enables effective gene-ablation by random modification of the coding sequences or by complete ablation of the gene. However, precise modification of the gene sequences, such as incorporation of a DNA fragment into specific loci, are still difficult to make. In this work, I present a review of CRISPR/Cas9 system, its use in production of mutant mice and possible modifications of the system to increase the efficiency of precise gene-targeting.

Keywords:

CRISPR/Cas9, mouse, transgenesis, homologous recombination