Johns Hopkins Engineering

Methods in Neurobiology

Animal Models

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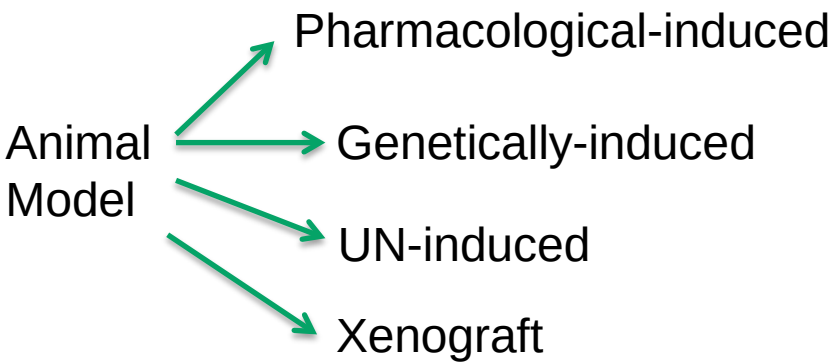
Types of animal models used in biomedical research

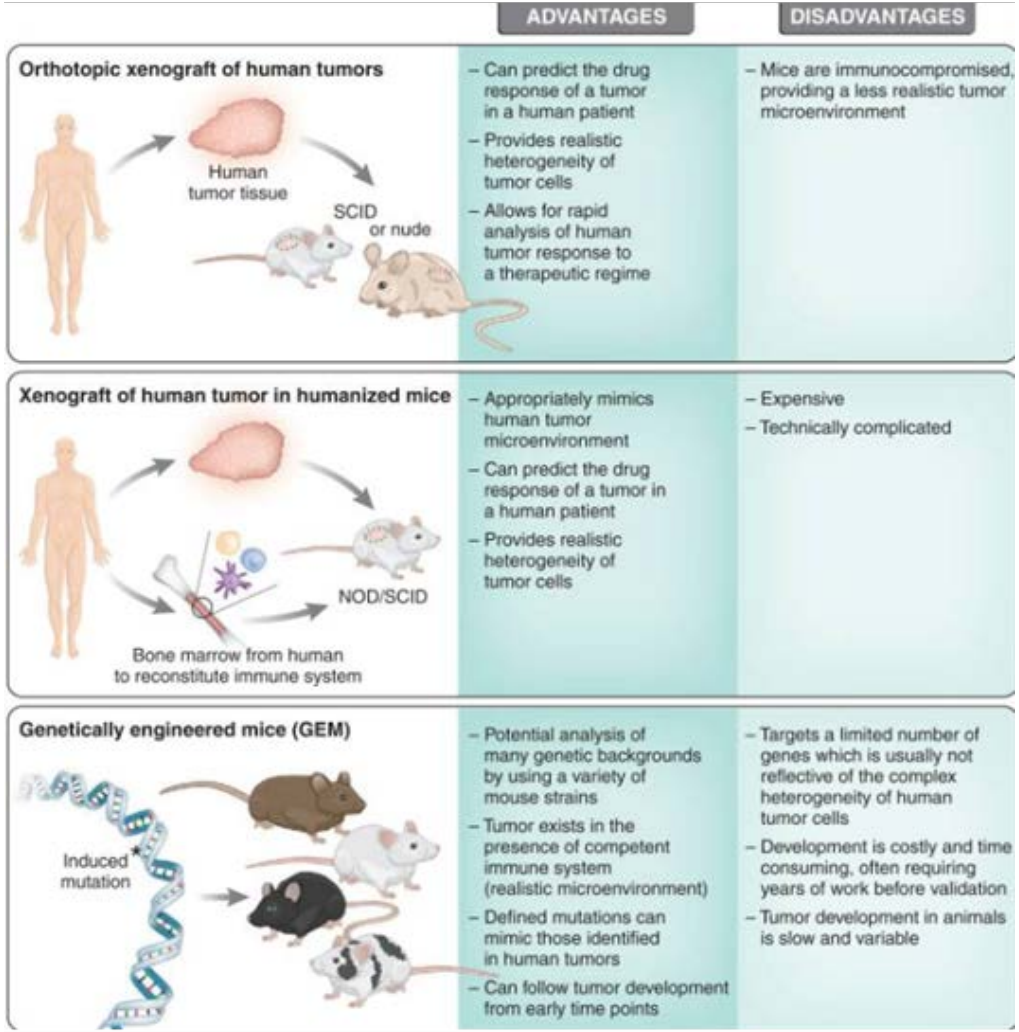


- Monkey
- Rat
- Mice
- Dog
- Pig
- Sheep
- Guinea Pig
- Nematode
- Drosophila
- …

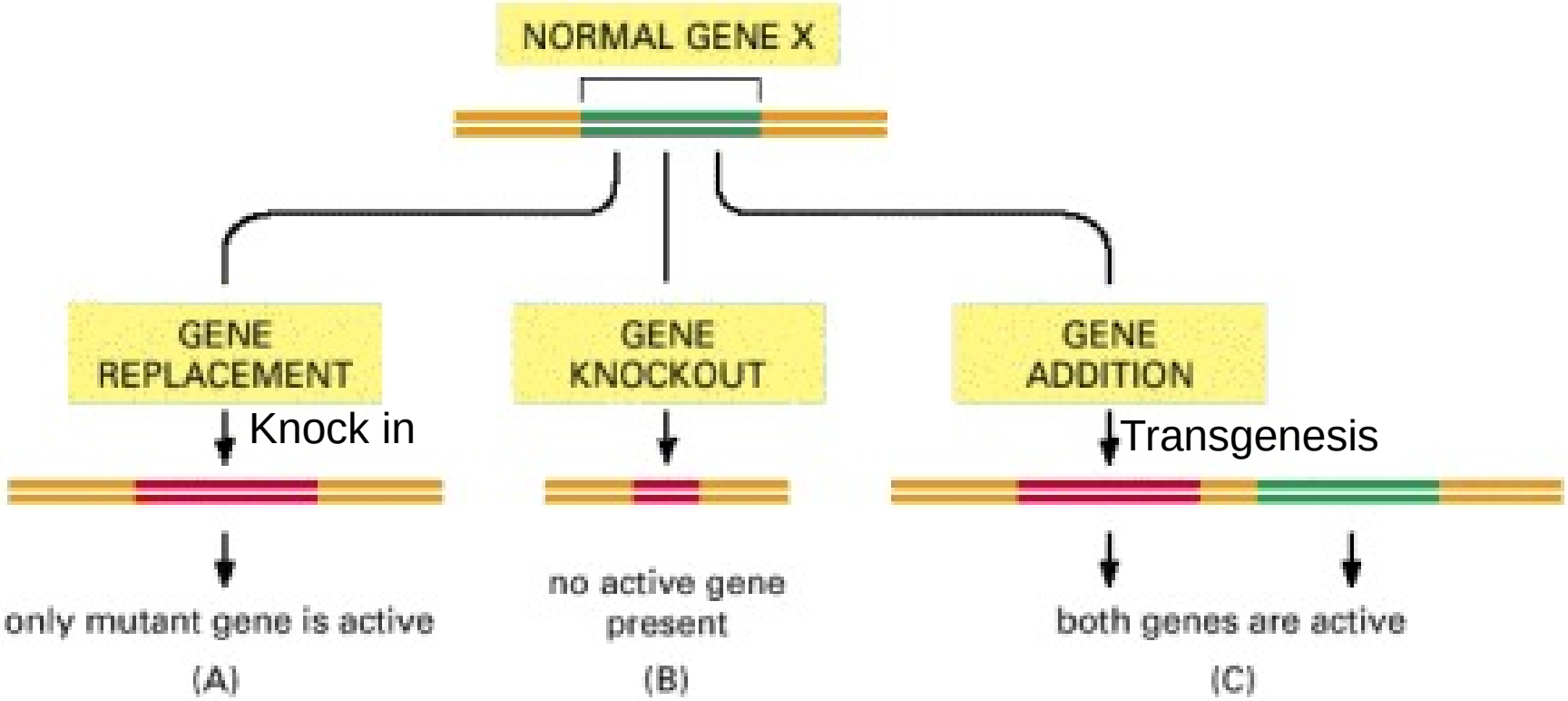
Common animal models used for genetic engineering

Model Organism	Common Name	Research Applications
Saccharomyces cerevisiae	Yeast	Used for biological studies of cell processes (e.g., mitosis) and diseases (e.g., cancer)
Pisum sativum	Pea plant	Used by Gregor Mendel to describe patterns of inheritance
Drosophila melanogaster	Fruit fly	Employed in a wide variety of studies ranging from early gene mapping, via linkage and recombination studies, to large scale mutant screens to identify genes related to specific biological functions
Caenorhabditis elegans	Roundworm (nematode)	Valuable for studying the development of simple nervous systems and the aging process
Danio rerio	Zebra fish	Used for mapping and identifying genes involved in organ development
Mus musculus	House mouse	Commonly used to study genetic principles and human disease
Rattus norvegicus	Brown rat	Commonly used to study genetic principles and human

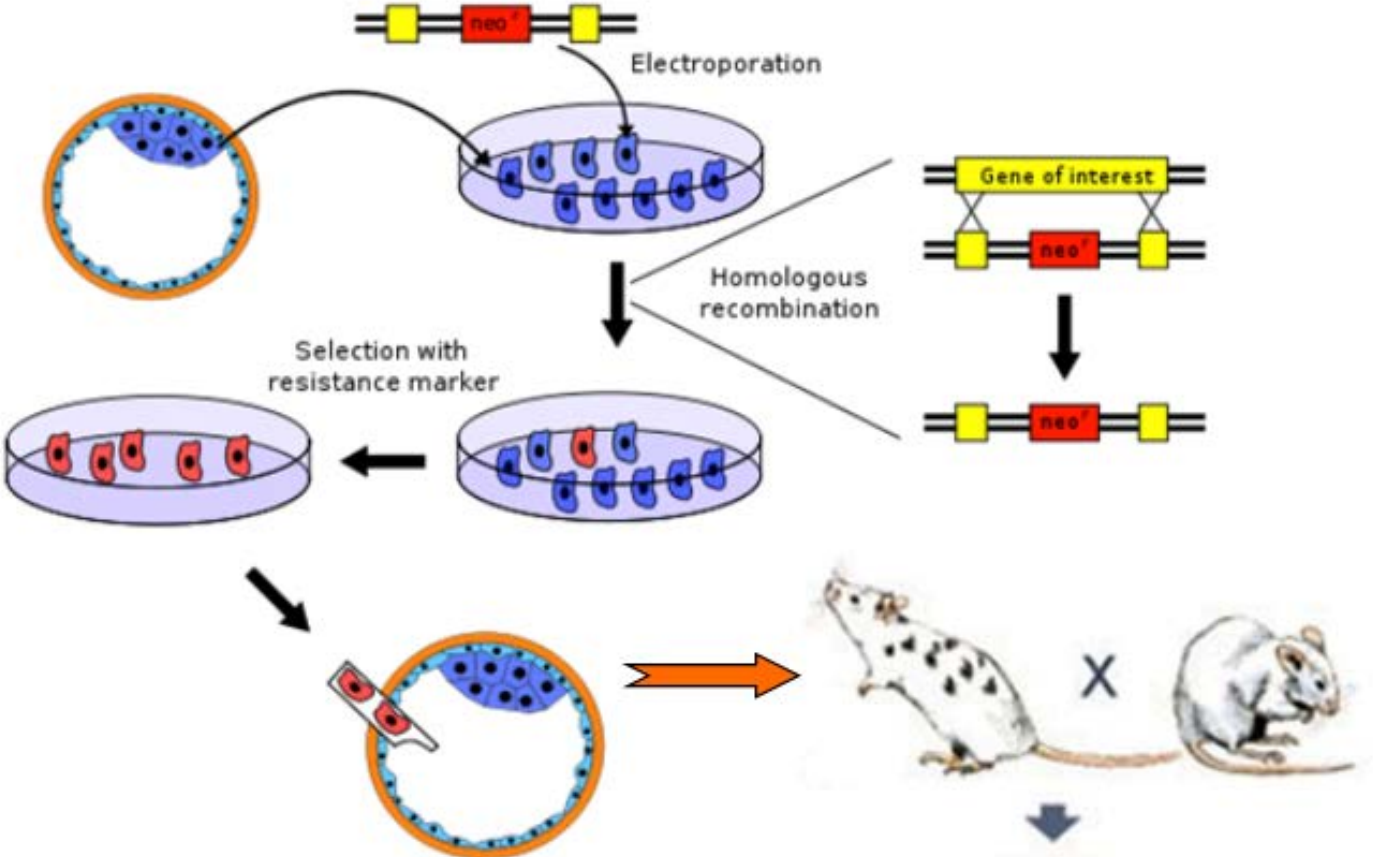
Xenograft models for cancer research



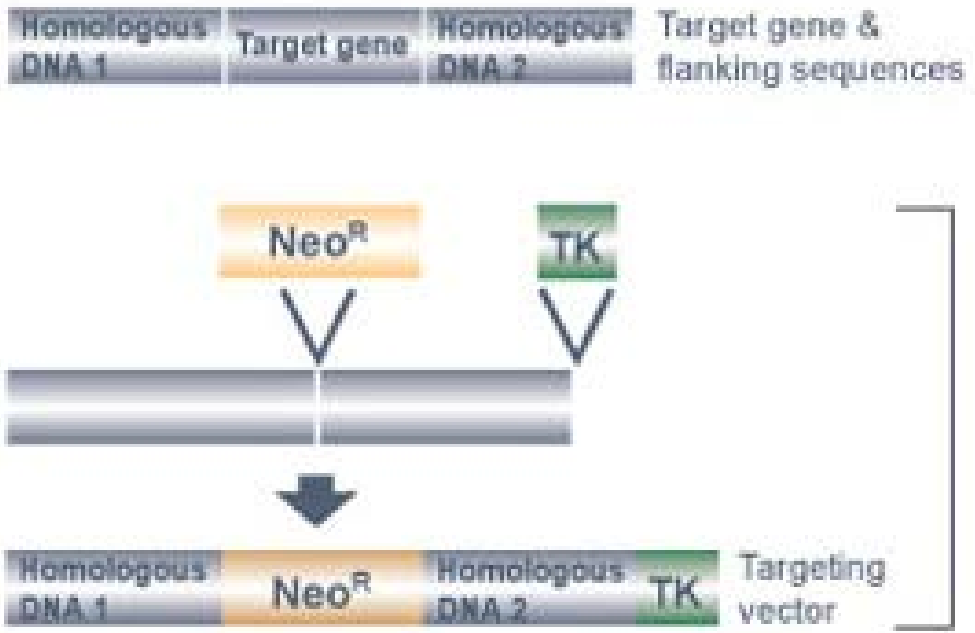
How to make animal models with genetic engineering



How to make a Knock out (KO) or a Transgenic (Tg) mouse

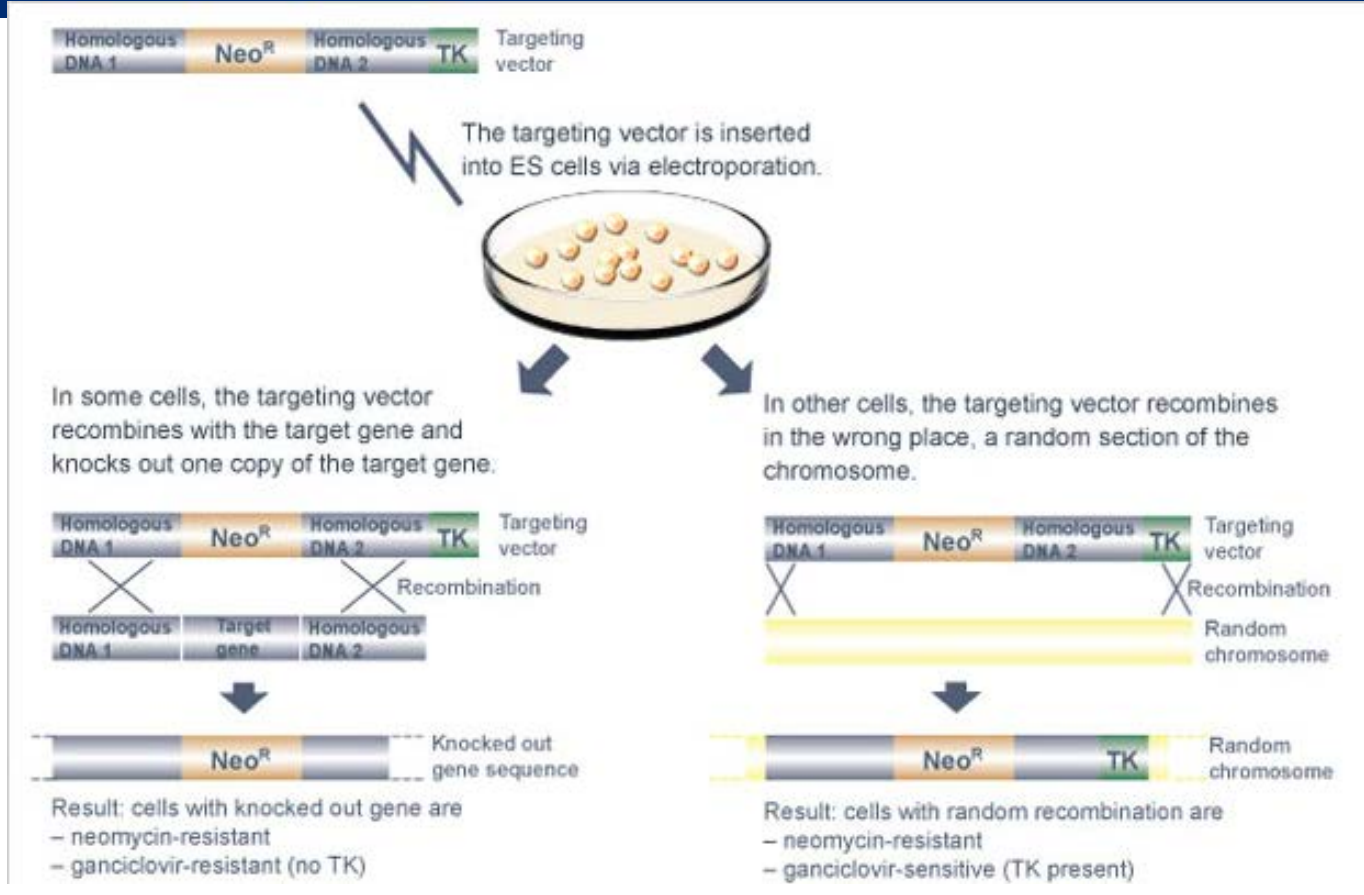


Inserting genes with homologous recombination

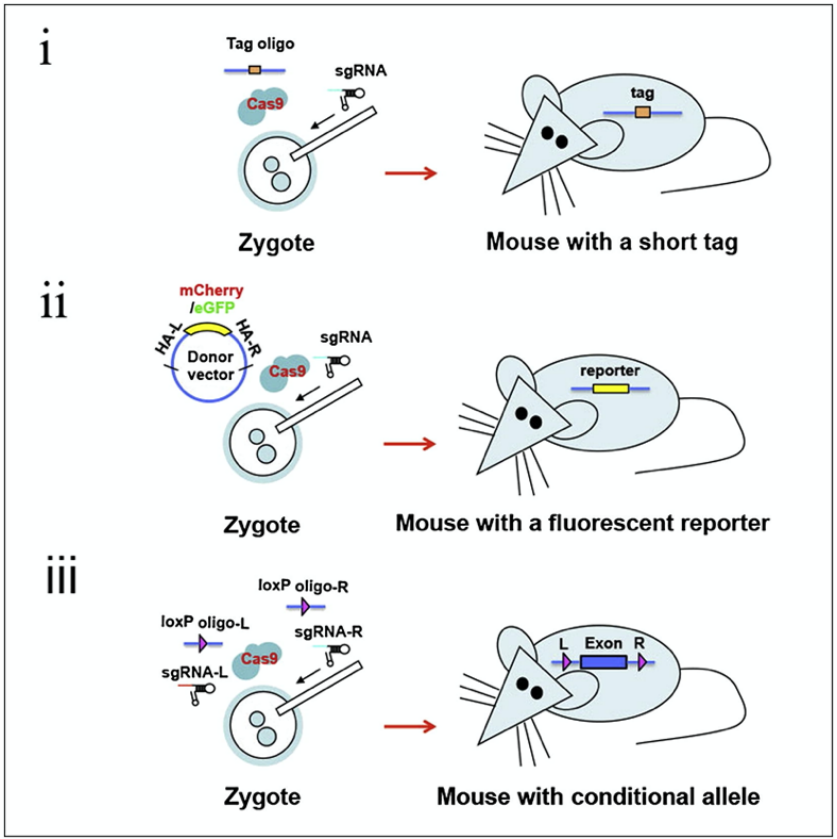


The markers Neo^R and TK are inserted into the target gene sequence to make a targeting vector sequence.

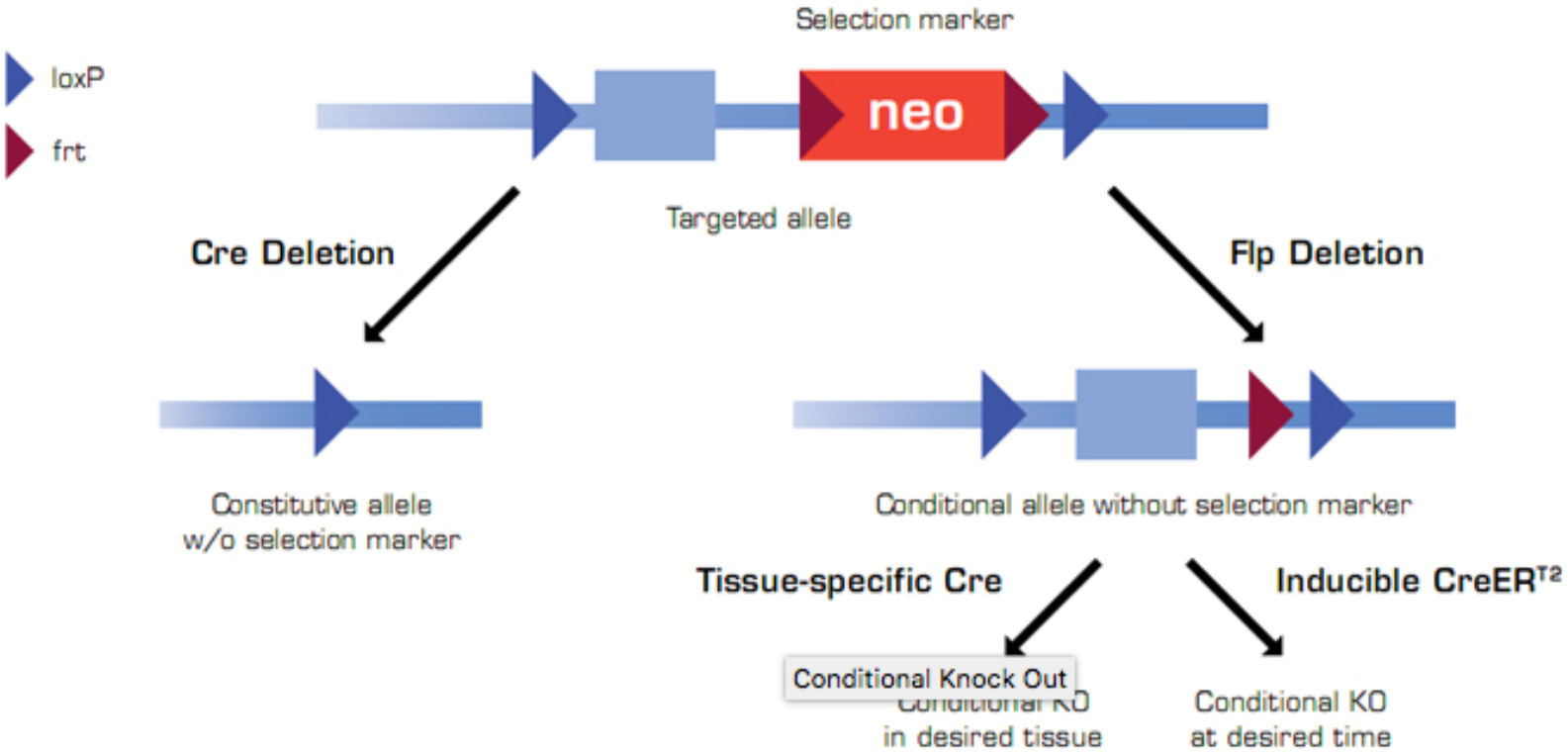
Inserting genes with homologous recombination



How to make mouse models with CRISPR/Cas9



Conditional KO mice



References

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