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A Future Challenge: ES cells application for generating KO mice of disease model in Indonesia

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Abstract

The mouse has developed into the premier mammalian model system for genetic research. Mice act as a good analogue for most human biological processes since both species share about 99% of the same genes. The knockout (KO) mouse has been a valuable tool for geneticists to discern the role of a gene in embryonic development and in normal physiological homeostasis. The mouse genome can be engineered by transfection with in vitro DNA constructions to carry a specifically designed mutation. The technique of gene targeting allows for the introduction of engineered genetic mutations into a mouse at a determined genomic locus. The process of generating mouse models with targeted mutations was developed through both the discovery of homologous recombination and the isolation of murine embryonic stem (ES) cells. These ES cells are totipotent, when injected into a mouse blastocyst, they can differentiate into all cell types of a chimeric mouse. A chimeric mouse harboring cells derived from the targeted ES cell clone can then generate a whole mouse containing the desired targeted mutation. Mouse models currently available for genetic research include thousands of unique inbred strains and genetically engineered mutants. There are mice prone to different metabolism disease (Diabetes, obesity, etc.), cancers, blindness, Lou Gehrig's disease, Huntington's disease, anxiety, aggressive behaviour, alcoholism and even drug addiction. Immunodeficient mice can also be used as hosts to grow both normal and diseased human tissue such as nude mice. This poster show outlines the major genome manipulations method available in the mouse that are used to understand human disease and the further challenge to develop this system in Indonesia.

Keywords: ES Cells, KO Mice, homologous recombination.