

Generation of induced pluripotent stem cells by a polycistronic lentiviral vector in feeder- and serum- free defined culture

ABSTRACT

Induced pluripotent stem cells (iPSCs) have great potentials for regenerative medicine. However, serious concerns such as the use of the viral-mediated reprogramming strategies and exposure of iPSCs to animal products from feeder cells and serum-containing medium have restricted the application of iPSCs in the clinics. Therefore, the generation of iPSCs with minimal viral integrations and in non-animal sourced and serum-free medium is necessary. In this report, a polycistronic lentiviral vector carrying Yamanaka's factors was used to reprogram mouse fibroblasts into iPSCs in feeder- and xeno-free culture environment. The generated iPSCs exhibited morphology and self-renewal properties of embryonic stem cells (ESCs), expression of specific pluripotent markers, and potentials to differentiate into the three-major distinct specialized germ layers in vitro. The iPSCs were also shown to have the potential to differentiate into neural precursor and neurons in culture, with greater than 95% expression of nestin, Pax6 and β III-tubulin. This body of work describes an alternative method of generating iPSCs by using polycistronic lentiviral vector that may minimize the risks associated with viral vector-mediated reprogramming and animal derived products in the culture media.

Keyword: Feeder-and serum-free; Neural precursor and neuron cells; Polycistronic lentiviral vector; iPSCs

