Enhancement of soluble expression and stability of reprogramming factor Ascl1 using 30Kc19 protein for the generation of protein-induced neuronal cells

박희호†, 유지나[1], 황석연[1], 박태현[1]
강원대학교, 화학생물공학부; [1]서울대학교, 화학생물공학부
(hhpark@kangwon.ac.kr†)

Direct reprogramming of non-neural lineages to functional neurons holds great potential for neural development, neurological disease modeling, and regenerative medicine. Recently, single reprogramming factor Ascl1, which is the key driver in the reprograming of induced neuronal cells (iNCs), was used to directly reprogram fibroblasts into neuronal cells. However, most methods require the use of genetic materials and/or potentially mutagenic molecules to generate iNCs. Herein, we used 30Kc19 protein as a novel fusion partner and generated 30Kc19-Ascl1-NLS-R9 (30ANR) fusion protein to generate protein-induced neuronal cells (p-iNCs). The 30ANR protein showed enhanced soluble expression and stability of the reprogramming Ascl1 protein. We confirmed that intracellular delivery of the 30ANR protein resulted in iNCs generation. p-iNCs expressed neuronal protein markers. The p-iNC system eliminates risk associated with the use of genetic materials, and therefore could be useful for safe generation of patient-specific human neurons for future applications in regenerative medicine.