

Improved Generation of Induced Pluripotent Stem Cells From Hair Derived Keratinocytes - A Tool to Study Neurodevelopmental Disorders as ADHD

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Abstract

In the last decade, there is an increasing application of induced pluripotent stem cells (iPSCs) for disease modeling. The iPSC technology enables the study of patient-specific neuronal cell lines *in vitro* to evaluate dysfunction at the cellular level and identify the responsible genetic factors. This approach might be particularly valuable for filling the gap of knowledge at the cellular and molecular levels underlying the pathophysiology of various neurodevelopmental and/or psychiatric disorders, such as attention-deficit hyperactivity disorder (ADHD). However, the invasiveness of skin biopsy or blood withdrawal might represent a major impediment in such protected population. Using hair derived keratinocytes as starting somatic cells circumvents this problem as sample collections can be performed non-invasively. Here we describe an improved, convenient, standardized and effective method to culture and reprogram hair derived keratinocytes from three healthy controls and one ADHD patient into iPSCs, which in turn will be used to generate differentiated neuronal cells. All the cell types were maintained in highly defined, serum-free conditions and showed expression of the respective key marker genes, assessed by both immunocytochemistry and qRT-PCR. The described *in vitro* personalized neuronal model has its advantage in modeling neurodevelopmental trajectories since it can recapitulate key processes of brain development at the cellular and molecular level and is intended to be used as for example studying ADHD etiopathology.