



# Millipore Tools for Characterizing Induced Pluripotent Stem Cells

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Recent advances have highlighted the ability to reprogram both mouse and human somatic cells back to an early embryonic state by the introduction of specific factors. These induced pluripotent stem (iPS) cells have similar characteristics to embryonic stem cells and hold great promise in various aspects of research from the establishment of patient-specific stem cell populations to disease models.

Millipore provides a wide range of tools to help researchers characterize iPS cells. These high-quality antibodies and kits have been used in iPS research (see reference list below for more details).

## TRA-1-81

In order to assist in the selection of successfully reprogrammed human cells, Millipore's TRA-1-81 antibody was used to stain for unfixed, potentially reprogrammed colonies<sup>1</sup>. The TRA-1-81 positive colonies were further expanded for characterization and the use of antibody selection provided a method to screen for reprogrammed cells.

Description	Catalogue No.
Anti-TRA-1-81	MAB4381

## SSEA-3, SSEA-4, AND TRA-1-60

iPS clones derived from human somatic cells can be further characterized using the human embryonic stem cell specific markers SSEA-3, SSEA-4, TRA-1-60, and TRA-1-81. Various research groups have taken this approach, with excellent results<sup>2,3</sup>.

Description	Catalogue No.
Anti-SSEA-3 Antibody	MAB4303
SSEA-4 Antibody	MAB4304
Tra-1-60 Antibody	MAB4360

## ALKALINE PHOSPHATASE

Undifferentiated stem cells are known to express high levels of alkaline phosphatase. Likewise, iPS cells, when assessed by Millipore's Alkaline Phosphatase detection kit, also demonstrate high levels of alkaline phosphatase expression<sup>2</sup>.

Description	Catalogue No.
Alkaline Phosphatase Detection Kit	SCR004
Quantitative Alkaline Phosphatase Kit	SCR066

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## TELOMERASE ACTIVITY

Somatic cells that have been reprogrammed have high telomerase activity. TRAPEZE®-RT Telomerase Detection kit is a convenient tool for monitoring this activity, and has been proven to work with iPS cells<sup>3,4</sup>.

Description	Catalogue No.
TRAPEZE-RT Telomerase Detection Kit	S7710

## DNA MODIFICATION

Reprogramming cells also changes the DNA methylation status of their pluripotent gene promoters. Millipore's CpGenome™ Modification Kit has been used to examine this process in iPS cells with its bisulfite genomic sequencing approach<sup>2,4,5</sup>.

Description	Catalogue No.
CpGenome Universal DNA Modification Kit	S7820

## DIFFERENTIATION MARKERS

Correctly reprogrammed iPS cells should be able to differentiate *in vitro* and *in vivo* towards the three primary germ layers. Antibodies to  $\beta$ III tubulin and tyrosine hydroxylase, among others, have been used to characterize these *in vitro* differentiated cells<sup>4</sup>.

Description	Catalogue No.
$\beta$ III-tubulin Antibody	CBL412
Tyrosine Hydroxylase Antibody	AB152

## References

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2. Park I.H., Zhao R., *et al.* Reprogramming of human somatic cells to pluripotency with defined factors. *Nature* **451**:141-6 (2008).
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4. Takahashi, K., Tanabe, K., *et al.* Induction of pluripotent stem cells from adult human fibroblasts by defined factors. *Cell* **131**: 1-12 (2007).
5. Takahashi, K., and Yamanaka, S. Induction of pluripotent stem cells from mouse embryonic and adult fibroblast cultures by defined factors. *Cell* **125**: 663-676 (2006).



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