Docket #: S10-347

Targeting a novel gene in human embryonic stem cells creates unique strategies for isolating and analyzing developing endoderm

Stanford researchers have developed several research tools to help study the role of a novel gene in the developing endoderm of embryonic stem cells. They created two constructs with two negative selection markers to increase the efficiency of homologous recombination in human pluripotent stem cells, both embryonic stem cells (hESC) and induced pluripotent stem cells (iPSC). With these tools, the novel gene can be better targeted for studying gene function, lineage tracing and mutation correction. They also generated a novel eGFP knock-in human ESC line to study endoderm differentiation, oligodendrocytes and hematopoietic stem cells. Thirdly, they identified three novel surface markers on stem cells to help identify the embryonic endoderm. This finding provides the ability to isolate endoderm derived from hESC and iPSC for further differentiation to downstream cell types, including pancreatic, liver and intestinal cells. Since the embryonic endoderm is an inaccessible human tissue, this new technology opens new opportunities to investigate and understand the differentiation of the human endoderm into the functional epithelial compartment of multiple internal organs.

Applications

- Gene targeting in human pluripotent stem cells
- Evaluation of endoderm differentiation
- Screening for conditions to induce the novel gene expression
- Study of organogenesis in vitro

Advantages

- Isolation of purified embryonic endoderm using FACS
- Ability to study developmental and molecular process of endoderm
- Increased efficiency of hESC targeting
- First knock-in hESC line for this locus

Publications

- Wang P, Rodriguez RT, Wang J, Ghodasara A, Kim SK. Targeting SOX17 in Human Embryonic Stem Cells Creates Unique Strategies for Isolating and Analyzing Developing Endoderm. Cell Stem Cell. 2011-03-04; 8(3):335-346.

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