

# Growth-Factor Cocktail Driving Differentiation of Stem Cell-Derived Human Podocytes

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# PROBLEM

Large scale production of normal terminally differentiated human podocytes has not been successfully accomplished. Although some protocol available can isolate primary podocytes, these podocytes cannot be expanded to a significant number. Podocyte cell lines are another source of production, except these often result in poor differentiation, are transformed by introduction of oncogenes, or are of non-human origin. A large-scale viable generation of human podocyte is necessary in drug development to assess the effect of therapeutic agents on podocyte health and functionality. Additionally, due to the absence of therapeutic interventions that augment podocytes, the standard of care for certain kidney disorders has been dialysis.

## SOLUTION

A complex growth factor cocktail of six signaling agonists/antagonists that result in direct induction of podocytes from nephron progenitor cells. An important factor is that the method is scalable, and the protocol does not require serum conditions. The robust protocol allows induction of podocytes from multiple cell lines (embryonic stem cells) and induced pluripotent stems cells with similar efficiency. Podocytes from certain embodiments may be used for implantation into the kidney of a patient for kidney cell replacement therapy. Another use of these human podocyte's cells would be to test drug effects on kidney by measuring podocyte response to a candidate drug.

Overall, various applications for these generated podocytes include an in vitro model for kidney/ glomerular disorder, therapeutic approaches (tissue regeneration/repair or transplantation), drug development, and tissue engineering.



Fig. 1A: Differentiation scheme used to obtain podocytes from embryonic stem cells

Fig. 1 B-D: The robust induction of podocyte markers

## PRODUCT

Method to differentiate and culture podocytes.

#### **VALUE PROPOSITION**

- Scalable production of large quantities of podocytes
- Induction of podocytes from multiple cell lines and induced pluripotent stems cells with similar efficiency.
- Based on only human cells allowing readily application towards therapeutic and regenerative medicine approaches

### **DEVELOPMENT STAGE**

Method developed and validated

INTELLECTUAL PROPERTY US Patent Pending

#### **CONTACT INFORMATION**

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