Methods of Tissue Repair, Regeneration, and Tissue Engineered Compositions

Tech ID: 19692 / UC Case 2001-205-0

BRIEF DESCRIPTION

End-stage renal disease (ESRD) affects almost 350,000 people living in the United States with an incidence that has increased by over 50 percent in the past decade. The two current treatment modalities for ESRD, dialysis and transplantation, both have significant limitations. Patients on dialysis have an extremely high mortality rate, approaching 20 percent per year. Although patient survival is markedly improved with renal transplantation, the number of renal transplants is severely limited by the short supply of available organs and many patients die while awaiting transplantation of a kidney allograft. Recently, several alternative modalities have been proposed including augmentation of traditional hemodialysis with a "renal assist device," xenotranplantation of whole developing kidney rudiments into adults, and the generation of histocompatible renal tissue using nuclear transplantation techniques.

FULL DESCRIPTION

Scientists at UC San Diego have developed a method of propagating ureteric bud (UB) cells in culture under conditions that induce the UB to undergo branching morphogenesis in order to generate a population of UB comprising tubular branches, subdividing the UB population, and resuspending each subpopulation in culture media. They have isolated an epithelial ureteric bud branching morphogenetic activity from the metanephric mesenchyme-derived cell conditioned medium and identified one of such molecules as an 18 kDa heparin binding protein, pleiotrophin. The invention demonstrates that purified pleiotrophin induces impressive branching morphogenesis of the isolated UB *in vitro* and provides methods of using pleiotrophin and compositions comprising pleiotrophin or other factors in the conditioned medium to induce morphogenesis in the kidney cells *in vitro* and *in vivo*. Additionally, methods and compositions are provided for constructing stable mammalian embryonic epithelial tissues and organs as well as constructing kidney tissue and treating renal failure.

APPLICATIONS

Potential uses of pleiotrophin and related factors include:

- Kidney growth, morphogenesis, and regeneration *in vivo* and *ex vivo*.
- *In vitro* engineering of nephrons and artificial kidneys from kidney progenitor cells and embryonic tissues.
- Repair and regeneration of the injured kidney (eg. acute tubular necrosis from ischemic or toxic insult).
- Protection and growth of tissue for transplantation.
- Treatment of chronic kidney by gene therapy or other method of administration.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,148,149	04/03/2012	2001-205
United States Of America	Issued Patent	7,326,570	02/05/2008	2001-205

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Method for Engineering Functional 3-Dimensional Kidney Tissue
- A Method for Rapid Generation of Many Different Branched Epithelial Proto-Organs

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OTHER INFORMATION

CATEGORIZED AS

- **Medical**
  - Disease: Kidneys and Genito-Urinary System

RELATED CASES

2001-205-0

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